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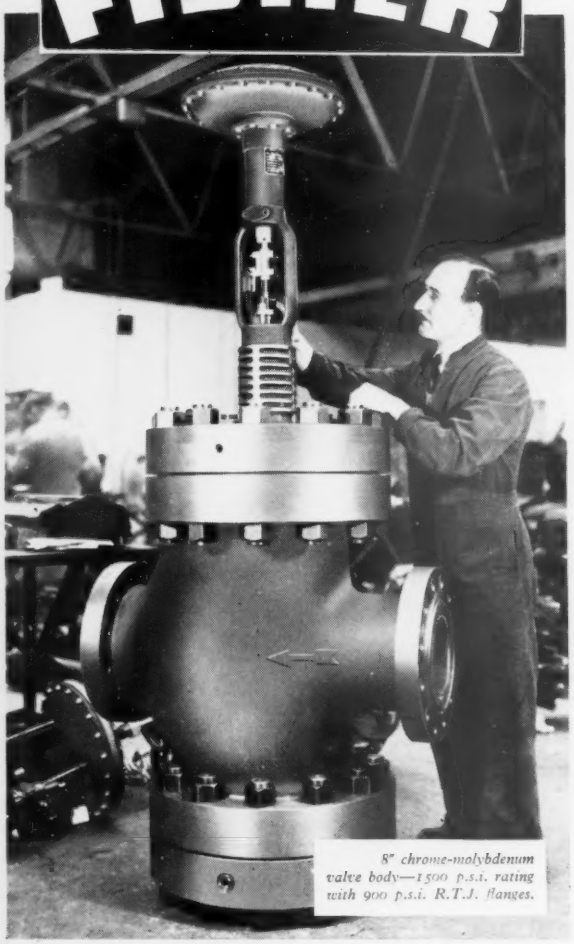

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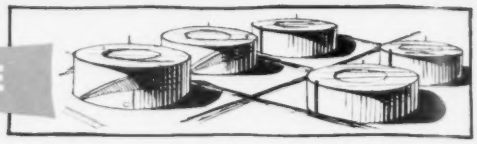

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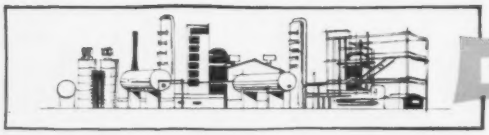

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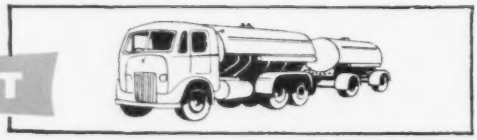

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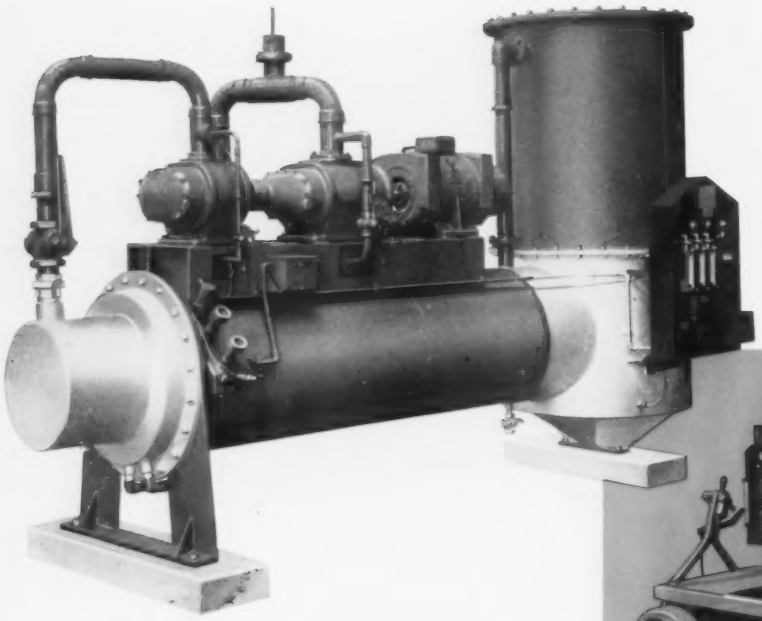

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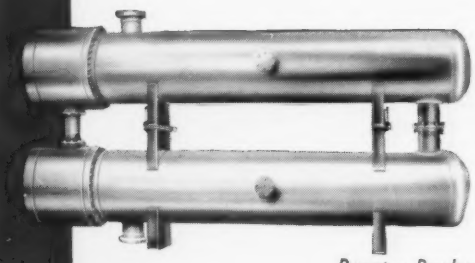

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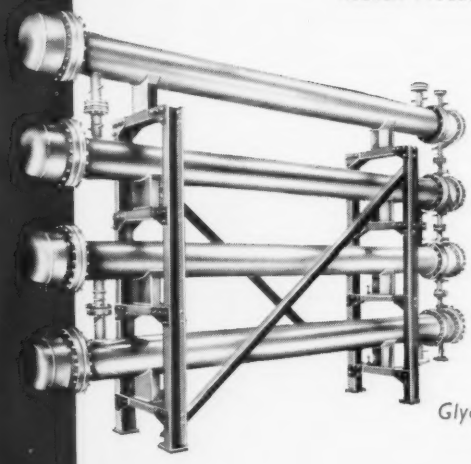

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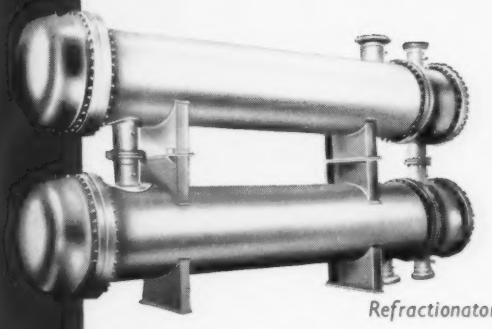

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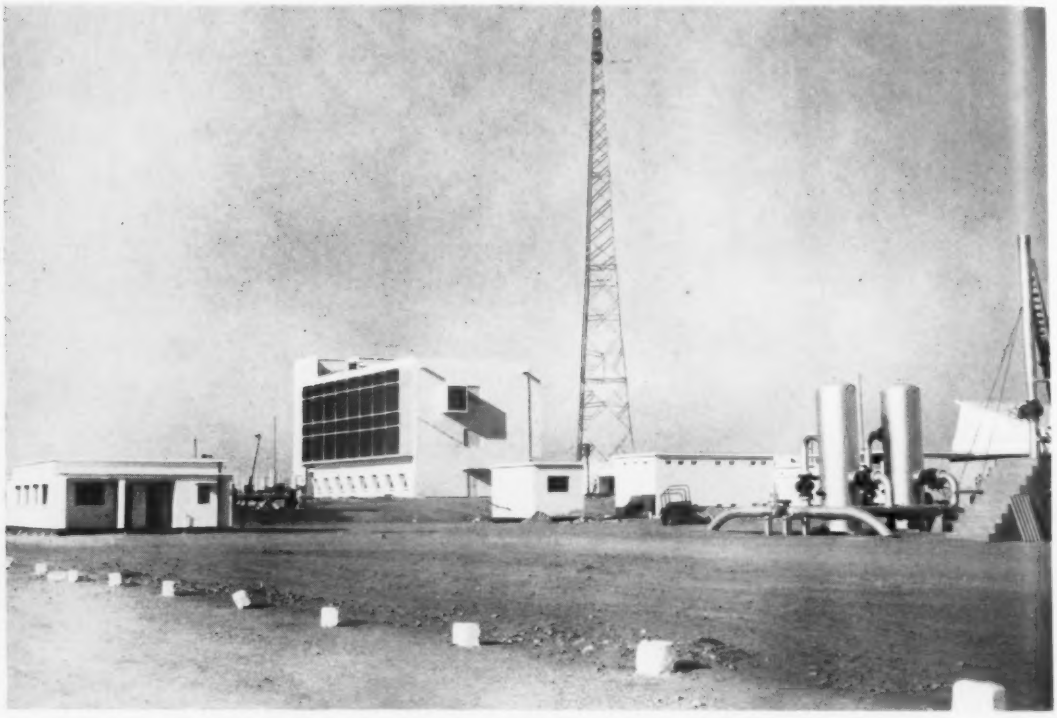

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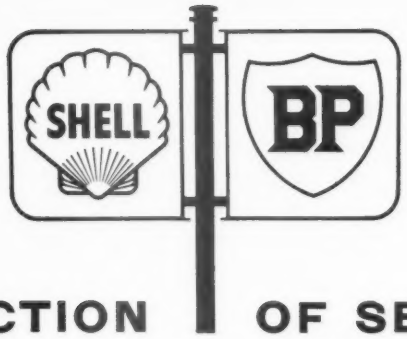

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UNTIL this moment, there has never been a collective noun for a lot of related service-stations. For until recently, there has been no need for one in this country. Now there is. Shell and BP Stations are so numerous that a collective word has to be found. The most apt is a *satisfaction* of service-stations.

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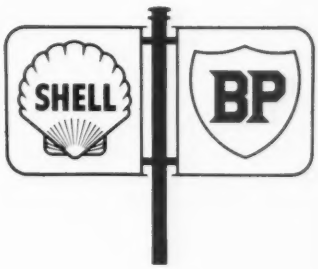

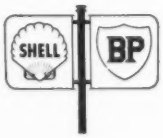

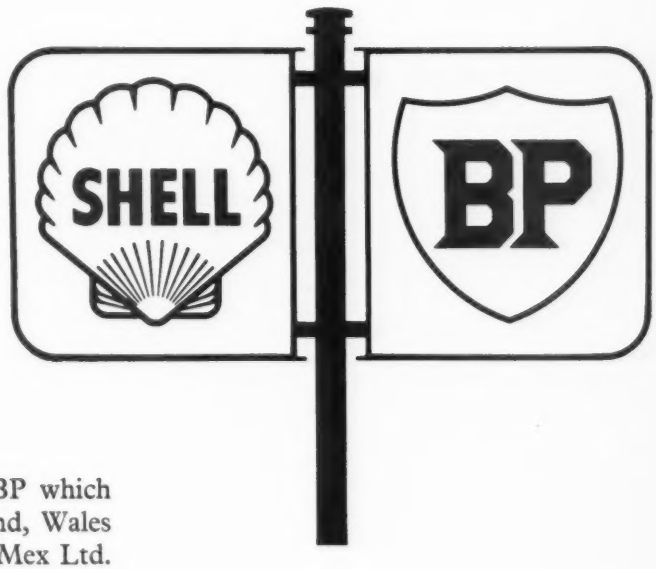

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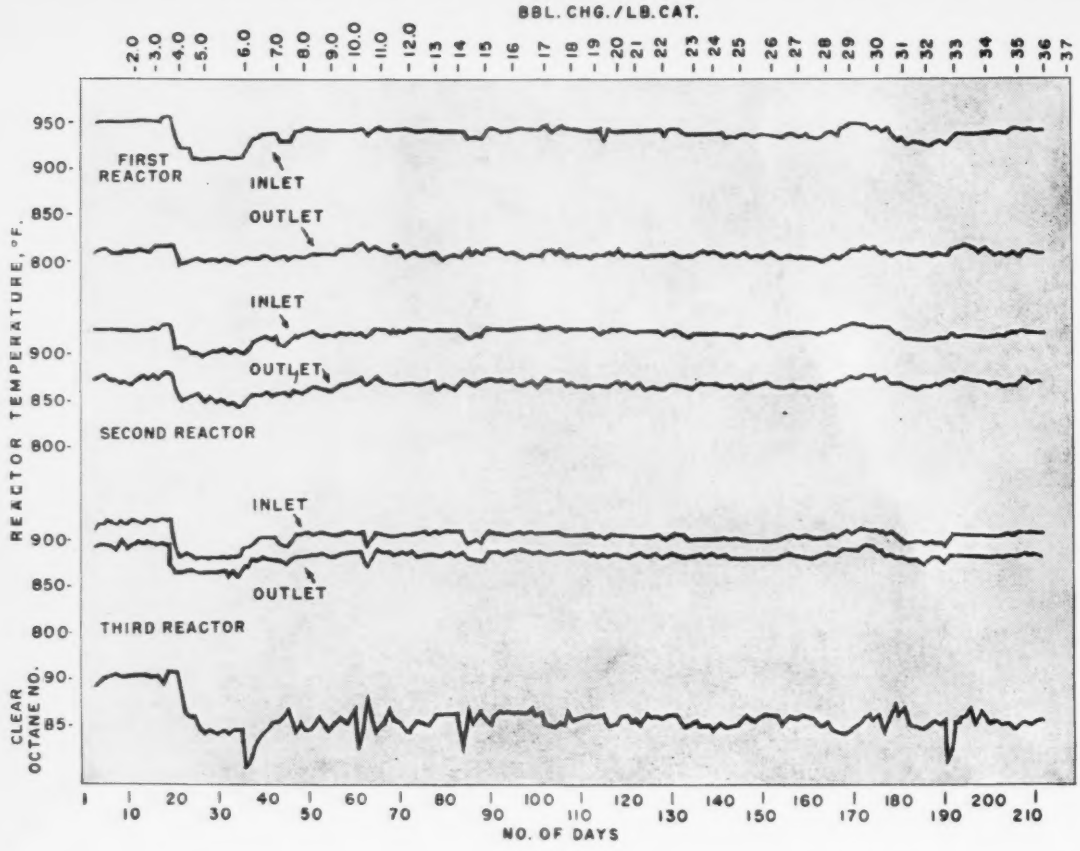

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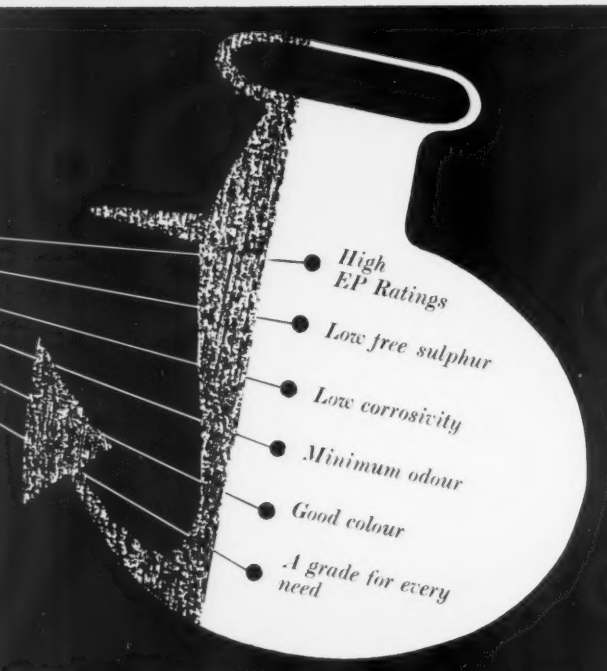

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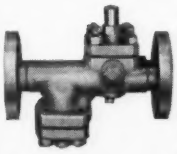

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THE INSTITUTE OF PETROLEUM
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The New Home of The Institute of Petroleum

For the first time in its forty-two years of existence the Institute is to have its own permanent headquarters. Council has been considering such a step for some considerable time and the steady growth of the Institute's activities during the past few years has made a move to a more spacious building imperative, if this expansion is to continue.

On 24 October 1955, the purchase of No 61 New Cavendish Street, W.1. was completed, and the Institute is now the possessor of one of the noble historical houses of the Regency period. The house, which contains over 7000 sq. ft. of office and hall space, was built by Robert Adam, one of the greatest architects of his time, in 1777.

Since the second world war the building has been unoccupied and the internal decoration has considerably deteriorated, but it is hoped to restore the main rooms and hallway to their former dignity and character, adapt the upper floors into modern offices, and convert the basement into a lecture theatre, with a spacious lobby and a canteen.

The main rooms include a beautiful example of an Adam hallway and staircase, a splendidly proportioned drawing room with fluted pillars, which will become the Council Chamber, and a really magnificent room with a fine Adam ceiling, on the first floor, which will become the Library. This opens out through double doors into another large Adam-ceilinged room, which will become the Members Reading Room.

Copyright *Country Life*

The Adam ceiling of the room which will become the Library

The house has been bought with a leasehold of 999 years, and is only about two hundred yards from our present home. Parking facilities are excellent.

A Building Committee has been set up under the leadership of Mr H. S. Gibson, empowered by Council to take all necessary steps to rehabilitate the building, to provide for the Institute a headquarters of dignity and character that will be worthy of the oil industry. The Committee has been fortunate in securing the services as architect of Mr R. N. Wakelin of Campbell Jones and Company.

Seasonal Variations in Oil Demand and their Effects on Oil Operation

A meeting of the Economics and Operations Group of the Institute, held on 14 *November* 1955 *under the chairmanship of W. H. Davies, took the form of a symposium on seasonal variations in oil demand and their effects on oil operation. The speakers were M. E. Weinstein of Shell-Mex and BP Ltd, J. A. Paul of Mobil Oil Co Ltd, and A. G. Taylor of Esso Petroleum Co Ltd.*

M. E. Weinstein spoke first and said:

In order to provide, as it were, a backcloth to the discussion which is to take place, it may be helpful to indicate, in a statistical setting, what has been the historical pattern of demand for some of the main petroleum products. This analysis will be confined to certain products only, with a view to seeing whether there can be identified any changes in the pattern compared with pre-war demand. It will, of course, be obvious that, from the very fact that there has been a substantial increase in the volume of total demand for oil products, and that such increase has been most uneven as between the products, any problems which existed pre-war in meeting the seasonal changes are that much greater.

Starting with motor spirit, Chart I shows the position in the dealer section and here there are a number of interesting features. With the general trend upwards, the pattern, apart from the double peak in 1950 when rationing came to an end, has not really changed very much compared with pre-war. In making the comparison with 1938 it must, however, be borne in mind that that year was itself a little untypical, because of the peak in the late summer which was due to panic buying owing to Munich. The main change worth identifying in regard to this product is that the post-Easter to Whitsun dip, which is seen to be very pronounced in 1938, has tended to become smaller and smaller, and in fact this year entirely disappeared.

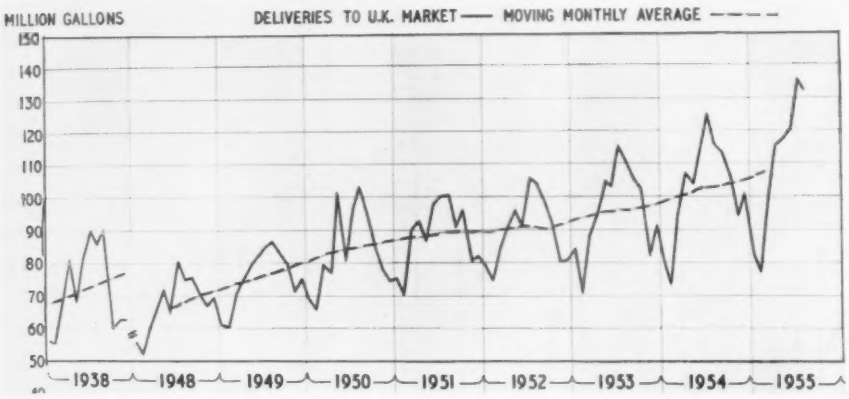


CHART I (*Above*)
Motor Spirit to Dealers, Seasonal Variations

Turning to burning oil, Chart II, there is an entirely different pattern; in fact, statistically it is almost a perfect unimodal distribution which has, with very few exceptions been repeated year by year. A steady and continuous decline from the winter peak is balanced by an equally steady and continuous climb back again. The only change which is taking place now that the market is reviving, owing to the urban demand for space heating, is that the swings are much greater than they were. In fact, looking at Chart III, which is an enlargement of the

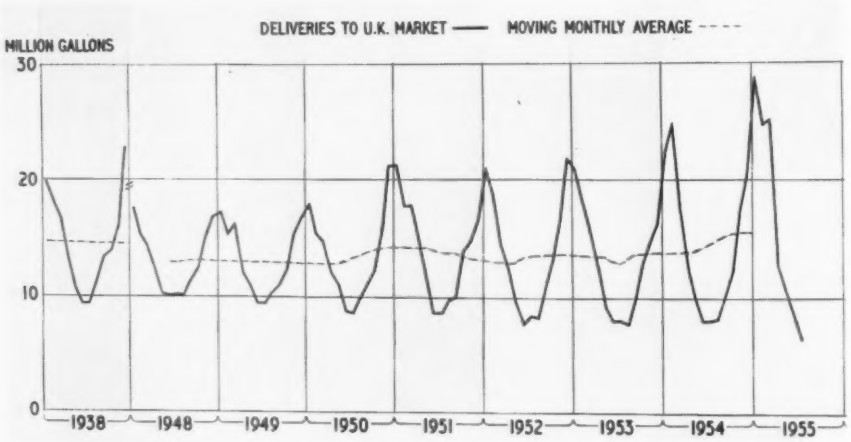
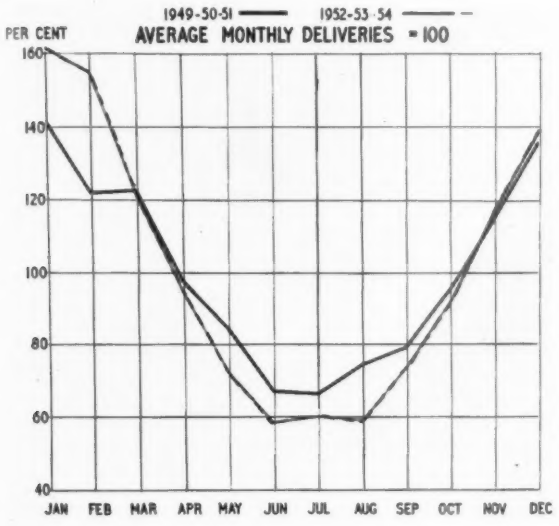


CHART II
Burning Oil, Seasonal Variations

CHART III
Burning Oil
Change in Amplitude of Seasonal Variation



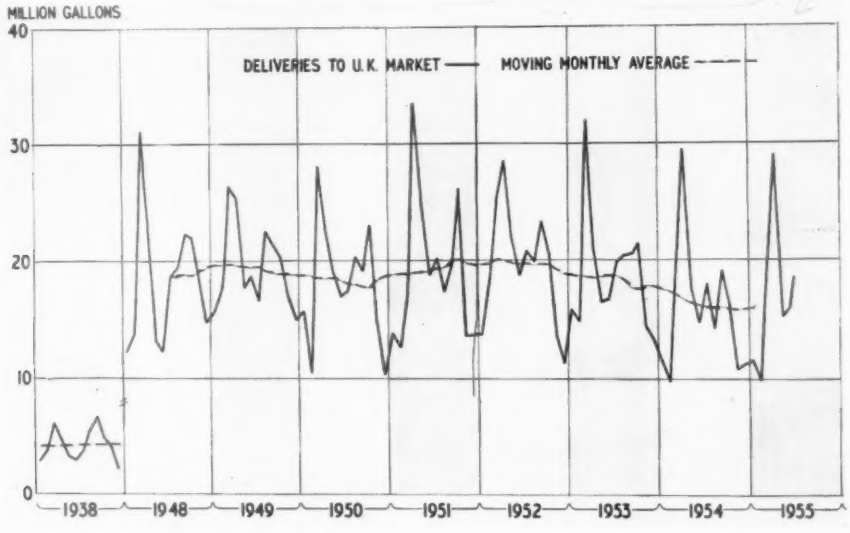
six-yearly trend in two three-year sections, the amplitude of the seasonal variation for the second three-year period is seen to be very much greater than for the first three-year period. This is entirely due to the development of demand in urban areas which responds to temperature variations, whereas in earlier periods, when the rural demand was pre-eminent, that demand was only in part for space heating but also for lighting and cooking, which, of course, is a much more stable requirement.

So far as vaporizing oil is concerned, it is a product which is unique in two ways; first, because it has expanded out of all recognition compared with pre-war, and secondly, because nonetheless it is now the one petroleum product showing a tendency to decline. It exhibits, Chart IV, just as wide a range between its two extremes as for burning oil, but the distribution is much less uniform. There is, moreover, a striking change in the character of the market post-war, after British agriculture had been mechanized. There were two peaks pre-war and although we still have two peaks, they are of a very different kind. Before the war the two peaks were roughly of the same volume, with the autumn peak, if anything, tending to dominate. Post-war, however, the spring peak is by far the greater and the summer demand, particularly since the switch from arable to grass, is around the annual average and not a definite trough as pre-war.

Finally, in this very selective review of products, there is gas oil, chosen partly because it is not a single market, and partly because to take fuel oil in its present stage of rapid expansion would be to select a product whose pattern cannot be clearly discerned. There are really three markets for gas oil—the gasworks business, the agricultural business, and the general small space-heating and industrial power section. The gas oil variation, Chart V, is a fairly rhythmical one, although not so smooth as burning oil; with the growth in the market, however, fluctuations are more sensitive to temperature changes and in general tend to make the swings up to the peaks greater each year.

At this stage, the position can be summarized by drawing attention to Chart VI, which denotes average seasonal variations for the years 1948-54, and superimposes these on the single pre-war year 1938. It can now be seen rather more clearly that there has been a noticeable flattening out of seasonal variations, although expression in this form may tend to exaggerate what has taken place, because of the marked secular growths in many of these markets. Taking the position in regard to motor spirit to dealers, it seems that the post-summer decline in demand is being reduced more and more by the new cars which are coming on to the market, and looking back at the more detailed position on the earlier chart, certainly over the last two years, the peaks which were apparent pre-war are tending to reproduce themselves. This would appear to be a reflection of the character of the new demand for motor spirit, which is essentially marginal, *i.e.* many of the new motorists are tending to use their cars only

CHART IV
Vaporizing Oil,
Seasonal Variations



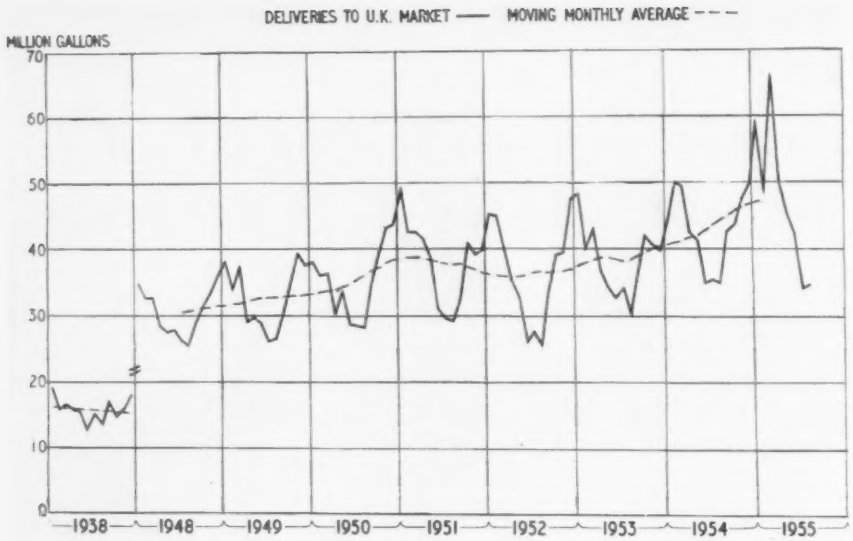


CHART V
Gas/Diesel Oil, Seasonal Variations

at holiday periods, and it may well be that in two or three years' time there will be a much closer resemblance to the post-war pattern. It is frequently said that the oil industry is constantly changing, and it seems that it may well be right in the midst of a quite fundamental change in the market for motor spirit; it is affecting the relative importance of the individual months' sales and this must already be having an impact on the physical problems of handling demand.

Turning to vaporizing oil, the change in the character of the peaks is shown quite strikingly, and it is also noticeable that this change has been accompanied by a much more stable summer demand compared with pre-war. Whereas for burning oil the greater amplitude of swing, which has already been referred to, is made clear, for gas oil the pattern tends to be rather smoother, and that is possibly to some extent owing to the interaction of the different rates of growth of the three markets which gas oil now serves in significant quantities.

A final analysis seems to be needed which corrects the picture as displayed in terms of calendar months. The calendar is statistically quite abominable and it is, therefore, useful to indicate, Chart VII, for all products, including those which time has not permitted to be dealt with in detail, how the ratio of trough to peak has changed compared with pre-war, with the calculation this time in terms of working days. This is a fairer and more realistic way of dealing with the problem, and, of course, this is the way it is physically being handled. A general smoothing of the seasonal variation has taken place which is particularly noticeable in regard to motor spirit to commercial consumers which, because of the steady drain to derv fuel, has tended to stabilize a level of demand fairly effectively. Derv fuel itself, if there were time to deal with it in detail, would show some interesting variations, with peaks, for instance, in July during the holiday coach season. Fuel oil, another product not previously mentioned, is on the threshold of many new developments, and no doubt will in the future show an intensification in the present seasonal fluctuations; while bitumen has certain characteristics of its own, being subject to such external influences as the availability of money for road grants, and on its industrial side being tied to the building industry (which is,

CHART VI
Average Seasonal Variations

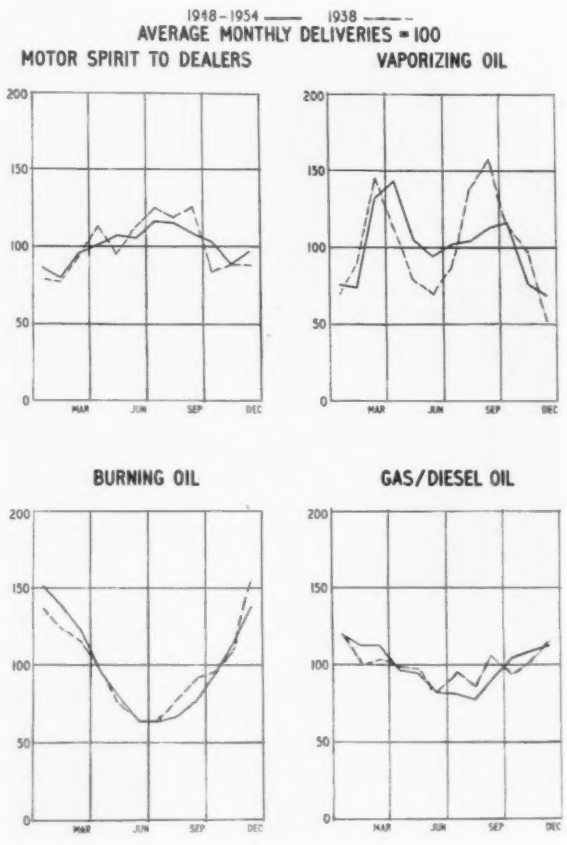


CHART VII

Peak and Trough Deliveries in the U.K. per Working Day
(Thousand Gallons)

Product	*Pre-war* (1938) *Peak*	*Trough*	*Ratio peak to trough* (*trough* = 100)	*Post-war* (1949-54) *Peak*	*Trough*	*Ratio peak to trough* (*trough* = 100)
Motor Spirit—						
Dealers	3492	2185	160	4079	2845	143
Commercial consumers	2084	1566	133	1954	1724	113
Derv fuel	238	159	150	1049	903	116
Burning oil	900	373	250	836	318	263
Vaporizing oil	255	86	296	1179	472	250
Gas-diesel oil	734	510	144	1748	1210	145
Fuel oil	748	484	155	3343	2055	163
	Tons	Tons		Tons	Tons	
Bitumen (tons)	2843	1206	236	2619	1659	158

to say the least, somewhat erratic), so that this product shows very marked and quite untypical variations from one year to another.

Finally, there is one further consideration, Chart VIII. This year there was both a particularly severe winter and a summer which will probably prove to be one of the best of the century. It is, therefore, worthwhile to see, merely in terms of the change in volume of sales month by month, what happened in 1955 as a result of the weather.

J. A. Paul said:

This contribution is that of a non-technical intermediary between the refinery, which needs to run as near to maximum capacity as possible all the year round regardless of seasonal consumption changes, and the consumer, who takes products when it suits him without having to worry about whether they are conveniently available or not.

Mr Weinstein's very admirable charts establish the existence of the seasonal variations in oil demand so clearly that it is a matter for regret that there is not a chart also for fuel oil; the seasonal movement in this product is one of the biggest problems with which supply people are faced.

The various charts show the most pronounced peaks and troughs for the kerosines, but, in practice, the handling of seasonal variations in this field is not normally a very serious problem. Quantities are relatively small and there is a complementary movement in the case of vaporizing oil and burning oil; except in mid-summer, the two sets of consumption figures show that one more or less balances the other, and so it is with supply. In the case of gas oil, there is again a tendency for various uses to balance themselves broadly, although where this product is de-graded for use as No. 2 fuel, a seasonal stock movement occurs in much the same way as with fuel oil.

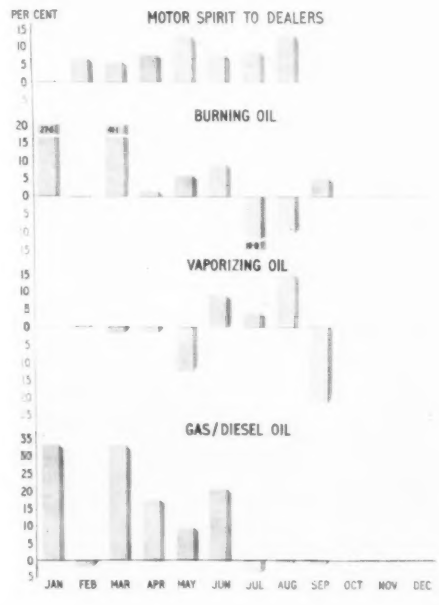
The principal problem on the supply side is the entirely opposite movement in the consumption of motor spirit as compared with residuals. Even though there may be some levelling out of the curve for the former, there still remains the difficulty that, in the summer, when motor spirit consumption is at its peak, fuel oil use is at its lowest ebb, and in the winter, the position is the very reverse. Production practices can cope with supply difficulties over kerosines and gas oil, but they cannot on their own solve the motor spirit-residuals consumption swing. The methods of dealing with that contrary movement are various, and three possibilities probably occur most readily as offering some solution.

The first is to change the refinery pattern of production to meet purely seasonal offtake. That is easier to say than to do; over a fairly long period of, say, a year or more, the production pattern is planned broadly to match offtake, but over any period of one month as against the next, the difference obtained from normal production changes is so small as to offer very little contribution at all to this particular problem.

The second potential solution is to continue at an even rate of production, regardless of what is moving in the market, and to build up stocks of the unwanted product. That is the ideal solution; it also has the demerit of being the most costly. It requires a substantial margin of tankage for each product over and above the normal requirements; that margin will be used for only a strictly limited time, of possibly one or two months, when stocks reach their peak. There is probably no refinery man, nor has one ever been known to exist, who considers that he has enough tankage to enable him to do that, and in fact, this ideal of building up stocks of the surplus product indefinitely, is very rarely attainable. Some use can be made of company-owned installation and terminal storage away from refineries, and, where it exists, tankage owned by storage companies specializing in such work. Some assistance is also afforded by the not uncommon practice of hiring storage occasionally from government departments, such as the Admiralty, where the tankage might not otherwise be in use. Such possibilities are, however, relatively few, and although they provide some contribution, there are clearly limitations to this ideal method of piling up the stocks.

CHART VIII

Monthly Percentage Increase or Decrease compared with 1954 *U.K. Market*



The third method of dealing with this problem is the reverse of the second, namely to tailor production to the requirements of the product in least demand. This would mean, in practice, that there would be no form of stock problem at all, but on the other hand there would very likely be instead a lot of unsatisfied customers, unable to get all they wanted of the product in greatest demand. This is hardly a constructive solution and is not one likely to commend itself to marketers; equally, making a big reduction in refinery production, does not provide a solution to the stock problem which has any attraction for anyone connected with refinery operation. Forced reductions in throughput, because of failure to move stocks, have thus to be avoided if possible, and can make only a strictly limited contribution to the overall problem, if more serious ones are to be avoided.

There is a fourth possibility, which may, in the future, have to be developed increasingly, and that is the development of tankage interchangeability between white and black products. If, in the summer, tankage which normally is in use for white products, can be used for storing surplus fuel oil, and if, in the winter, tankage can be used for storing surplus gasoline which would normally have been used for fuel oil, then you have the perfect solution; in practice such tankage is not generally interchangeable in this way, with the possible exception between crude oil and fuel oil. A degree of greater interchangeability may have to be developed in the years ahead, especially when the U.K. market for fuel oils expands and over the next ten years becomes the predominant influence on the whole U.K. pattern of trade.

To sum up, the problem of dealing in the U.K. with the major variations in seasonal demand is largely handled by a combination of the second and third methods outlined, by building up stocks, and to a lesser extent making some change in refinery throughput, whilst the future solution, with largely increased tonnages, may demand additional measures.

A. C. Taylor said:

The general pattern of the peaks in petroleum business through the years from pre-war to the present position has already been shown, but it is important also to give some picture of the effect these have on physical distribution problems.

Chart IX gives the figures for the twelve months July 1954 to June 1955, for five main product groups, namely burning oil, vaporizing oil, motor gasoline, gas-diesel oils, and fuel oils. The peak demand for these products tends to fall in the same month in many cases, and the period of lowest demand also tends to coincide. The chart shows the three months of heaviest demand and the three months of smallest demand for each product. At the present time the month of March shows a peak in four out of the five main products, followed closely by January as another month of heavy demand in which three of the products reach a peak.

The month of lowest demand, surprisingly, is August, with a minimum demand for three out of the five main products.

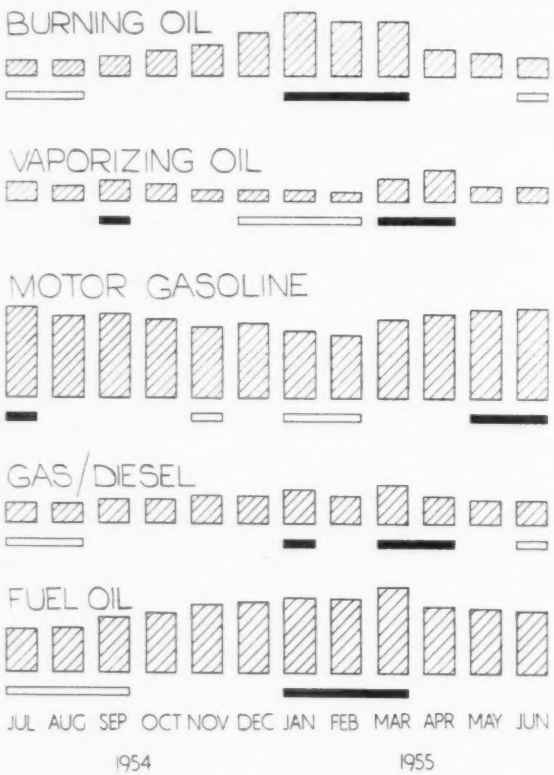
The columns of Chart X represent the total tonnages involved, and confirm that March presents the greatest physical problem. The added horizontal line drawn across this chart shows average demand spread over the twelve months. In March the demand is 250,000 tons above the average for the year.

The significance of having an extra quarter of a million tons above average to deal with in one month can be portrayed in the very simple picture shown in Chart XI. It can be seen from this that this quarter of a million tons represents no less than seventeen ocean tanker cargoes by the T.2 type of ship, 125 cargoes by a 2000-ton coastal vessel, over twelve and a half thousand 20-ton rail tank loads and nearly 21,000 loads by maximum-size road tank trucks. Of course no one would suggest that the industry needs this fantastic number of ships, rail cars or trucks to handle the peak deliveries. All the various units of transport will make many deliveries during the peak month, and the actual number of units needed will depend upon just how many trips each can make. It will be appreciated at once, however, that the total requirement for extra transportation must in any case be enormous.

Three major considerations must be considered. The first is the relationship of storage to total peak requirement, and this problem involves both the industry's own storage at terminals and bulk plants, and also storage at customers' premises. Obviously, if both the industry and its customers had sufficient storage to hold the total product requirement

CHART IX

Relative Incidence of Peaks and Troughs July 1954 *to June* 1955



for a peak month, there would be no special transportation problem, and the average monthly amount could be delivered steadily throughout the year, and would keep abreast with what was needed very comfortably in such a way. In practice, of course, it is almost impossible for this Utopian position to be achieved but it is the constant endeavour to step up the capacity of storages everywhere so that these peaks do not give rise to such a concentrated demand on transport facilities.

Within the industry, a great deal is done in advance stock piling ready for future peak demands and plans have to be made ahead on the basis of estimates drawn from statistics. The particular grade to be stock-piled at any one time depends

on the season for which one is trying to provide. The greater the stock pile that can be built in advance the less is the demand on transportation equipment for additional movement during the actual peak. As the requirement changes from product to product through the seasons, however, there is a strong need for flexibility within the physical organization and for freedom to make quite substantial changes in the products held in stock in a particular storage at any time. This flexibility in the proportions of grades which can be stored at any particular time is the second major point.

So far as customers' storages are concerned, it must be accepted that changing over the storage from one product to another is unlikely to be a very practical solution. Within the Esso organization, however, there is legislation for a considerable amount of flexibility of this kind. There is also some flexibility available in ships, rail cars, and road trucks, but here the third major point arises as the position is by no means as straightforward as one should like.

Chart IX showed a peak in four out of the five products in March and in three products in January. During these months the only products that were showing minimum demand were vaporizing oil and motor gasoline. The constant problem is that however much one tries to provide flexibility of tonnage and equipment, heavy fuel oil equipment is not usable for motor gasoline and vice versa. When, therefore, there is a set of conditions when everything is at a peak, except motor gasoline and vaporizing oil, it means that a major part of the physical equipment released by the slack motor gasoline trade is quite useless physically to relieve the burden imposed by heavy fuel oil demand. Similarly, in the period of peak gasoline demand the product showing the greatest slackness

CHART X

Combined Peak

Burning oil, vaporizing oil, motor gasoline, gas diesel oil and fuel oil July 1954 *to June* 1955

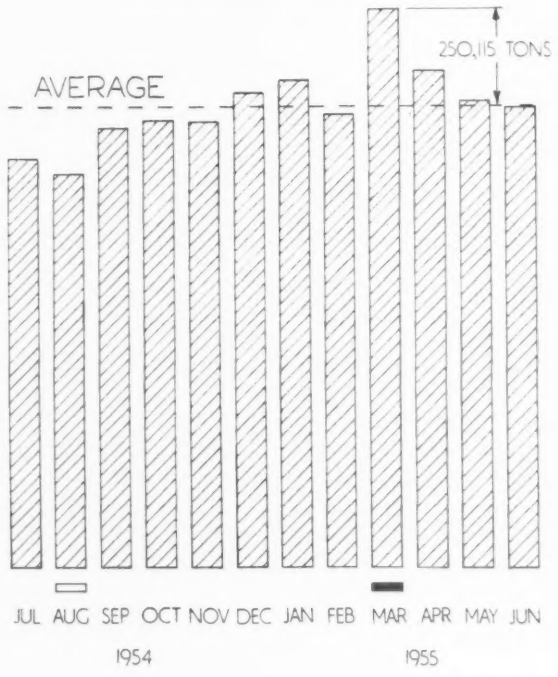


CHART XI

Equipment Required to Handle Peak Demand

	Tons
Peak month (March)	1,460,115
Average month	1,210,000
Excess	250,115

250,115 tons is equivalent to:

17 T-2 tanker cargoes

125 2000-ton coaster cargoes

12,506 20-ton rail-car loads

20,843 Large tank truck loads.

is fuel oil and again the equipment then made available is not usable to meet the gasoline peak.

The position is, however, not wholly pessimistic for recent years have shown improvements in the interchangeability of tonnage and equipment and, broadly speaking, these sections of the business can be divided into two main parts, namely the heavy fuel oil trade and the trade in white products which, in spite of its name, includes autodiesel and gas oil as well as motor gasoline and the kerosines.

The fourth subject to be highlighted is the possibility of developing in the U.K. something on the lines of what our friends in the United States know as the "degree-day" system of deliveries which in their case applies specially to oil used for office and domestic heating. Very simply the basis of this system is that the full details of customer storage and approximate consumption, month by month, are recorded at the oil company's plant, and careful records are maintained showing the average day and night temperature variations for each locality. Based on these details, a surprisingly accurate estimate can be made of what each heating plant will have consumed in the preceding twenty-four hours. Deliveries are despatched by the oil company as and when their records indicate the quantity that is likely to be required to fill up each storage. These deliveries are made mainly at night time by vehicles fitted with meters and ticket printers and the whole transaction can be completed without disturbing the occupants of the premises. There must, of course, be an offset fill pipe to which the driver can couple up and some mechanical device is fitted to ensure that tanks do not overflow. It is amazing, however, how accurately the true requirement can be predicted, and the system has worked with conspicuous success for several years. The advantage in allowing the industry to increase the productivity of each unit of equipment will be fully evident, and if we can develop here on similar lines it will go a long way towards minimizing the physical problem that a period of peak demands brings to us.

In conclusion it is necessary to emphasize the tremendous importance of this subject in view of the rapid expansion in the demand for petroleum and particularly in the growth of heavy fuel oil business to be anticipated in coming years. If this increase in the turnover has to be handled without a disproportionate increase in the amount of equipment

required, there must be greater overall storage both at oil company plants and customers' premises, and there must be increased utilization of our transport which can come only if industry as a whole is more ready to accept deliveries over a far greater number of hours each day than is now the case. If these things are not achieved the amount of capital that has to be invested in new equipment will be excessive and handling costs will undoubtedly increase and will in time tend to be reflected in consumer prices.

Discussion

Discussion following the symposium was opened by A. J. Foster who made the suggestion that some adjustment of crude oil feed to the refineries might help to solve the problem of disparity in demand for light ends and residuals. Mr Paul, in reply, said that the symposium had been confined to a consideration of the facilities and very limited grades of crudes available to the United Kingdom, the latter not allowing much flexibility. On a world-wide scale the problems of peaks and troughs need not arise because all that was ideally necessary was a chain of refineries suitably situated across the world so that seasonal variations could be cancelled out by the varying climatic conditions.

Various aspects of the problem of adequate tankage were raised during the discussion. A. J. Foster was the first to contribute to this subject by saying that in his experience a more rational and economic distribution pattern could be achieved if there were sufficient tankage both at refineries to flatten out seasonal peaks and also at primary re-distribution points so that they could receive economical amounts.

Both Mr Paul and S. D. Colwell spoke in support of Mr Foster's point of view, Mr Colwell emphasizing that tankage was also necessary at customers' premises. The oil industry was to blame in some degree, he said, for the fact that customers felt no obligation to provide tankage or to buy in appropriate quantities at an appropriate time.

Later in the discussion the question of storage was again raised, this time by Mr Oakley with reference to American methods such as the storage of oil in quarries and mines. Burning oil, Mr Oakley pointed out, was sold very cheaply in the U.S.A. in the summer to encourage customers to build up stocks, and a cheap rate was given for bulk buying.

Mr Colwell expressed the fear that the "degree-day" system of deliveries, far from encouraging customers to extend their storage, might encourage them to run on very marginal supplies. A. T. Worcester, however, gave reasons for the development of the system in the U.S.A. by drawing attention to the oil storage restrictions enforced in many American cities and the heavy insurance premiums demanded.

The advantages of "degree-day" deliveries in the utilization of transport were emphasized by G. A. Vickers who, returning to the question of tankage, also contended that the problems of making tankage interchangeable were not insuperable.

"Degree-day" deliveries were again referred to at a later stage in the discussion when H. E. Barry asked what reduction in price could be offered to encourage customers to take deliveries outside normal working hours. Mr Taylor did not think that any reduction could be made as the customer was already benefiting from a fully-utilized fleet in the price he now paid. He was supported in this view by Mr Colwell who said that any reduction which could be made would be insufficient to be of much value to the customer. M. E. Hubbard, on the other hand, was able to give the information that in France less was charged for products delivered at night from the pipeline from the lower Alps to Paris.

Apart from these questions of storage and delivery, many other interesting points arose for discussion. Mr Morton drew attention to the fact that although in the market as a whole vaporizing and burning oil tended to cancel each other out in consumption and in refining production, there were regional disparities in consumption which led to some sharp distribution problems. This was acknowledged by Mr Paul but he went on to say that, relatively, this was less of a problem because the gallonage involved was so much smaller than with products such as motor spirit.

The future intensification of seasonal fluctuations in fuel oil demand was another point referred to by Mr Morton. There were, he said, factors which he thought would militate against further intensification of peaks. Consumption by the Central Electricity Authority would be for base load stations, the sectors where expansion was expected were near the sea, and in those areas the power would be required for industrial furnaces rather than for central heating.

Base load power-stations could, Mr Paul agreed, do much to spread the tonnage of fuel oil more evenly, but in practice it might still be found that there was a seasonal element because of the changes in demand for electricity. In his opinion, a greater development was at present taking place in the use of oils for central heating than for industrial processes, and the more conversions there were to central heating the more acute would the seasonal swing become.

Continuing with the problem of fuel oil, Mr Goatman said that in his opinion a graph for fuel oil, drawn in terms of working days per month for the post-war period, would give a very similarly shaped graph to that for burning oil, and would show a V-shape consistent with quite considerable seasonal problems. In amplification of this point Mr Weinstein said that there was such a lot of new fuel oil business that any picture based on past experience would be misleading. Insofar as he could see a seasonal pattern, however, it did not show any great difference from that of the gas-diesel oils.

Turning to gasoline, J. Clark referred to Chart I and asked what change would be shown if special-grade gasoline were separated from the standard grade. He expressed the view that the standard grade would show relatively minor seasonal variations compared with a violent fluctuation for the special grade. Mr Clark also questioned whether the recent rise in price differential between the two grades was likely to even out demand between the two products.

Mr Weinstein replied that there was in fact a slightly different pattern in the seasonal variations of the two grades, but that so far as distribution was concerned there was no problem as both grades were carried in the same vehicle. The ratio of premier to standard grade deliveries was still rising and there seemed to be little slowing up, despite the widening price differential.

In answer to a question by C. I. Kelly regarding the information contained in his charts, Mr Weinstein said that the figures used were of actual deliveries into consumption. They were based on figures issued quarterly through the U.K. Petroleum Industry Advisory Committee and published by the Petroleum Information Bureau.

Asked to explain the fall-off in vaporizing oil consumption which occurred in 1954 and 1955, and whether the fluctuation was related to subsidies, Mr Weinstein said that this decline resulted from the fact that the vaporizing oil tractor was inefficient and was used only as a means of escape from the duty on light hydrocarbon oils. The advent of light-weight diesel tractors had meant a decline in the use of vaporizing oil which would accelerate as the change-over increased.

Around the Branches

BAHRAIN, FAWLEY, KUWAIT, LONDON, NORTHERN, SCOTTISH, SOUTH-EASTERN SOUTH WALES, STANLOW, TRINIDAD

Northern Branch

On 17 January the Branch held a symposium on the "Lubrication of Transport Fleets". The Branch Chairman invited A. T. Wilford, director of research, London Transport Executive, to take the chair and to open the symposium and, after some introductory remarks, Mr Wilford introduced the first speaker, S. H. Edge, chief engineer and assistant general manager of Clayton Dewandre Co Ltd.

Mr Edge dealt first with the importance of automatic chassis lubrication and went on to describe the various systems available, together with the particular components. Particularly interesting was his description of a complete tractor and trailer system.

Mr Edge concluded his paper by saying that the type of lubricant was less important than the frequency of its application.

J. C. Thompson, experimental engineer, Field Development, Perkins Ltd, was then invited to present his paper on Engine Lubrication. Explaining that he could discuss only one aspect of engine lubrication in the time allotted to him, Mr Thompson elected to discuss the effect of oil viscosity on wear and fuel consumption, to the great interest of the members present.

At the conclusion of Mr Thompson's paper there was general discussion until 9.15 p.m. when Mr Wilford terminated the meeting by thanking the two speakers. Mr Haslam then proposed that all three guests, Mr Wilford, Mr Edge, and Mr Thompson, should be acclaimed by the meeting. This was carried out with marked enthusiasm.

London Branch Tops 400 Mark

"Mr. Chairman", says R. F. Leach (London Branch Hon' Secretary), "You have just elected the four hundredth member of the Branch."

Scottish Branch

The Annual General Meeting of the Scottish Branch was held in the North British Station Hotel, Edinburgh, on 26 January. Among the officers re-elected at this meeting were: J. M. Caldwell, chairman, W. Stirling, honorary secretary, and Dr W. B. Peutherer, honorary recorder.

Mr Caldwell spoke of the honour which had been conferred on the branch by the nomination of Lord Geddes, a member of the Scottish Branch, as President Elect of the Institute of Petroleum. Lord Geddes will take office at the Annual General Meeting to be held soon in London.

Introducing Mr Keddie, who was to speak on "Oil Shale Mining", Mr Caldwell said that he was a certificated colliery surveyor and manager and was at present the mining agent with Scottish Oils Limited.

Mr Keddie began by saying that in Scotland the mining of oil shale to provide the raw material for the production of crude mineral oil to be converted into wax, diesel and gas oils, and motor spirit, had been in continuous operation for approximately one hundred years.

Oil shales, some eight in number, occurred as seams of mineral varying from 4 feet to 10 feet in thickness separated by widely differing series of strata, the whole extending to some 2500 feet in thickness and occupying the geological horizon known as the calciferous sandstone series lying below the coal measures in the carboniferous formation.

It was now well established, said Mr Keddie, that oil shales exist in commercial abundance in the U.K. only in the counties of Mid and West Lothian, and extending northwards below the Firth of Forth into Fife. A remarkable feature was that although their geological position persisted throughout the entire carboniferous areas the seams themselves were either thin or undeveloped.

Oil shale depositions were, however, prolific and disposed in abundance in many other parts of the world, and following the fundamentals of oil production and processing initiated a hundred years ago, numerous countries had subsequently developed oil shale mining operations.

It was generally accepted that in Scotland, owing to what ultimately proved to be the adaptation of scientific knowledge well ahead of his time, James Young, a Glasgow-born chemist, established near to Bathgate, West Lothian, in 1851, the foundation of an industry which was to grow to prodigious proportions in some sixty years, eventually employing about 12,000 men.

Side by side with this development, however, the growth of the natural petroleum industry, flourishing on the ever-increasing world demand for oil products, made the economic survival of the shale oil operations well nigh impossible. It was now only because of the application of Government preferential protection that the Scottish industry could exist, employing some 4000 persons, despite the enforced successive closures of uneconomic units.

The need for a supplementary or alternative supply of oil to that from natural sources had, however, led governments throughout the world to finance research into the field of synthetic fuel production, and this was particularly evident in the U.S.A. where it was confidently predicted that by the application of modern machines to their vast oil shale potentials it was within the realms of possibility that synthetic oil could be produced on an economic basis.

After discussion in which many members took part Mr Caldwell congratulated Mr Keddie on his excellent paper and on the manner in which he had delivered his address and answered the many questions.

* * *

Books and Films

"Mechanization of Livestock Farming"

In farming as in industry, a fresh appraisal of traditional practices can result in surprising reductions in labour and rewarding increases in productivity. It is with this in mind that Shell-Mex and BP have produced their latest documentary film for farmers, *The Mechanization of Livestock Farming*.

The livestock farmer has lagged behind the crop farmer in mechanization, and the film sets out to show how some of the present mechanical devices on the farm could be used to advantage on the livestock side. Not all the applications shown will be of interest to all farmers but the film's provocative approach should arouse some fruitfully critical discussion of accepted farming methods.

The film is in Eastman-Colour, runs for 20 minutes, and is available on free loan in 35 or 16mm sizes from the Public Relations Department of Shell-Mex and BP Ltd or from any of the Company's Divisional offices.

A suitable companion film for rural showing would be *Scrapbook No* 7—the latest in the series of Scrapbook Film Magazines produced by the same Company. This deals with a series of topics of interest to farmers—Landrace pigs, flooding in the Fenlands, and some features of the Bath and West Agricultural Show.

Labour saving feeding arrangement shown in "Mechanization of Livestock Farming".

Pictures of Oil

Pictures—nearly 100 large pages of them—telling the story of "the men who provide the world's oil" make up the contents of "World Oilmen", the explanatory text of which has been written by Dr A. M. Melland. The book is published by the Sylvan Press, price £2 2*s*.

All phases of the petroleum industry are illustrated, from the initial operations of exploration to the final utilization of the product. The canvas is world-wide—prospecting from Ecuador to Nigeria, New Guinea, and the Persian Gulf; drilling from Borneo to Venezuela; pipelines from Canada to Syria; tankers from the slipway to the high seas; refining from Great Britain to Australia; and marketing from France to Indo-China.

The book, designed by Ronald Sandiford, is well-produced and is available in English and French.

* * *

COUNCIL COMMENTARY

Council met on 11 January to discuss an agenda, which, although not long, provoked some interesting discussion.

It was learned with very considerable regret that J. A. Oriel wished to resign from Council owing to his business commitments. The vacant seat on Council will be occupied by M. E. Hubbard of the British Petroleum Company. As his was the only new nomination received for the next Council election there will be no necessity for a ballot.

Mr Oriel also found himself unable to represent the Institute of Petroleum at the World Power Conference to be held in Vienna in 1956 and it is hoped that another member of Council will be able to take over the responsibility in his place.

A. J. Ruthven-Murray has agreed to take over the Chairmanship of the Finance Committee from Mr Masterson who, as previously recorded, has been compelled to resign owing to pressure of Company work.

As a sidelight on the activities of the Institute's Research Committee it was announced that its Chairman, Professor Frank Morton, had been elected to the new chair of Chemical Engineering at the College of Technology, Manchester. Needless to say, Council heartily congratulated Professor Morton on his election.

Presentation to Sir Leonard Sinclair

Guest of honour at a reception in London in January was Sir Leonard Sinclair, chairman of Esso Petroleum Company Limited. His hosts were 200 representatives, chosen by ballot from the Company's 13,000 employees, and the occasion was the presentation to Sir Leonard of his portrait in oils in honour of the knighthood conferred upon him in the 1955 New Year's Honours List.

The presentation was made by Charles Payne, of the

Sir Leonard shakes hands with Charles Payne after the presentation while Lady Sinclair looks on.

Northern Divisional Office, who recalled that Sir Leonard and he were schoolboy friends. He had watched with great pride Sir Leonard's rise to his present position as head of their great company, of which he was the first member to receive a knighthood.

Sir Leonard Sinclair, receiving the portrait, said:

> "It is a wonderful gift and I am extremely grateful to those thousands of Company people, including pensioners, who have so generously subscribed to it, but even more so am I touched by the very kind sentiment which the gift expresses. I feel very unworthy of the generosity and the sentiment.
>
> "It is with great pleasure and pride that I receive it, and it is very appropriate that it comes to me through my old friend Charlie Payne who, as many of you are aware, I have known for over 50 years and it was through him that I joined the Company in Manchester in 1908.
>
> "He was one of the four office boys and in the performance of his many and various duties he one day took an advertisement for an office boy to the *Manchester Guardian* and, knowing I was about to leave school and seek a job, he gave me the box number for the reply.
>
> "I applied just before my thirteenth birthday and got the job, the junior of the four office boys, and had there been a job specification for that position it would have included being the Company's messenger boy and the clerks' errand boy, in which capacity I brought in tea and sandwiches for the clerks working late and beer for the chemist.
>
> "My salary started at 30s. 4d. per month, and we worked late hours, seldom leaving before 7.30 and frequently working up to 9 o'clock but we were happy in our job and we enjoyed our work."

Presentation to Lady Sinclair

A second and equally pleasurable ceremony followed when Miss M. Cunningham, secretary of the Presentation Committee, asked Lady Sinclair to accept a miniature reproduction of the portrait. She said that those who had contributed to the presentation were unanimous in their desire to express their appreciation of the part Lady Sinclair had played in the career of Sir Leonard and for the great interest she had shown in the affairs of the Company.

Lady Sinclair, in accepting the miniature, said it gave her great pleasure to see the high regard which the members of the Company had for her husband's services.

Lady Sinclair admiring the miniature presented to her by Miss M. Cunningham.

★ ★ ★

FIFTH WORLD POWER CONFERENCE

The general programme for the Fifth World Power Conference, to be held in Vienna from 17 to 23 June, this year, is now available on application to The Secretary, British National Committee, World Power Conference, 201 Grand Buildings, Trafalgar Square, London, W.C.2.

Some 300 papers in all have been submitted to the Austrian National Committee. Twenty-seven are to be presented by the British National Committee and a complete list of these is obtainable from the above address.

A full programme of social events has been arranged in addition to the technical sessions, and a number of post-conference itineraries has been drawn up covering power plants and other installations of interest in Austria.

The Economic Impact of Oil on the Arab Middle East

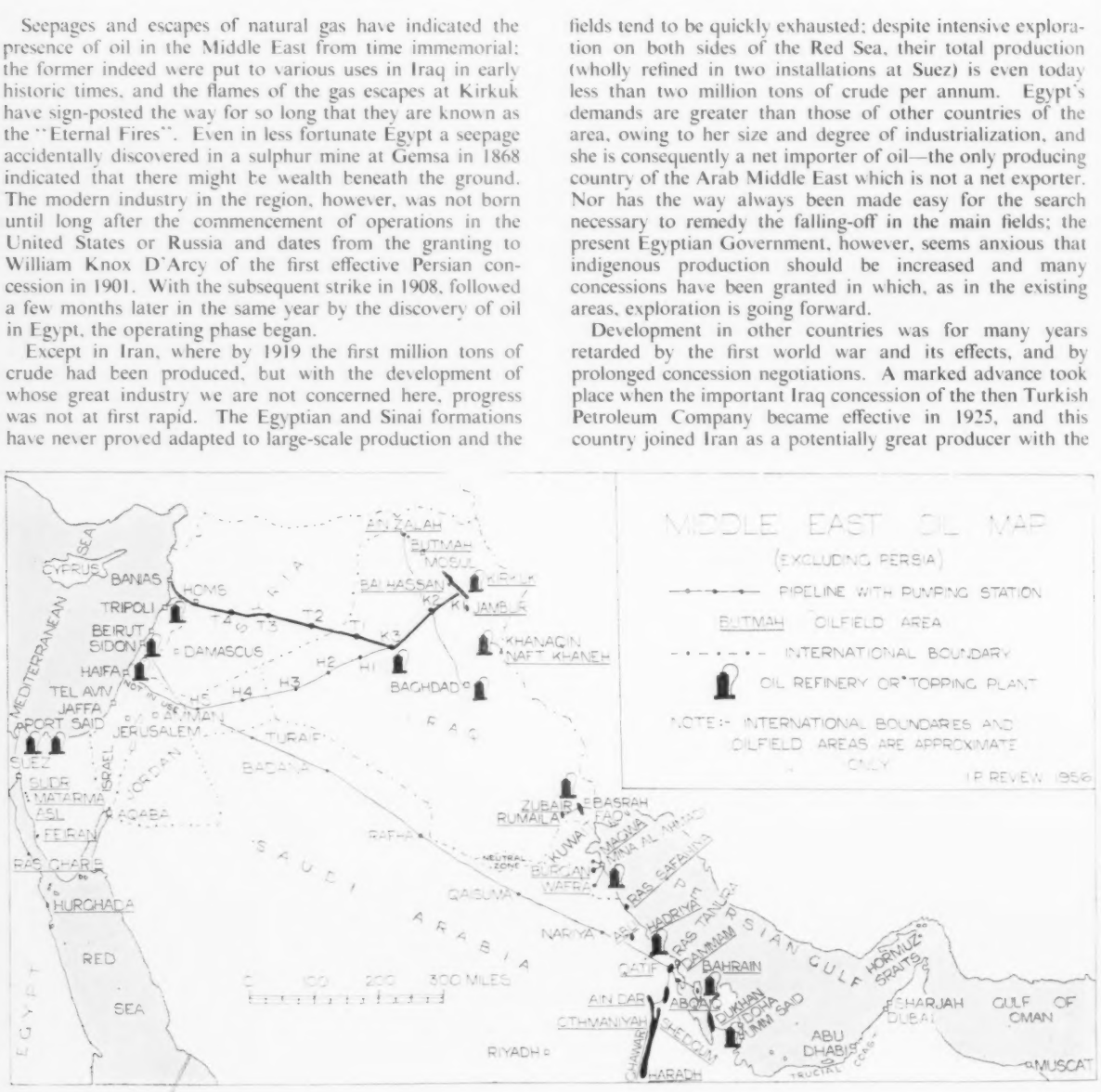
By JOHN MURRAY, O.B.E. (*Fellow*)

Part II The Expanding Operation

Seepages and escapes of natural gas have indicated the presence of oil in the Middle East from time immemorial; the former indeed were put to various uses in Iraq in early historic times, and the flames of the gas escapes at Kirkuk have sign-posted the way for so long that they are known as the "Eternal Fires". Even in less fortunate Egypt a seepage accidentally discovered in a sulphur mine at Gemsa in 1868 indicated that there might be wealth beneath the ground. The modern industry in the region, however, was not born until long after the commencement of operations in the United States or Russia and dates from the granting to William Knox D'Arcy of the first effective Persian concession in 1901. With the subsequent strike in 1908, followed a few months later in the same year by the discovery of oil in Egypt, the operating phase began.

Except in Iran, where by 1919 the first million tons of crude had been produced, but with the development of whose great industry we are not concerned here, progress was not at first rapid. The Egyptian and Sinai formations have never proved adapted to large-scale production and the fields tend to be quickly exhausted; despite intensive exploration on both sides of the Red Sea, their total production (wholly refined in two installations at Suez) is even today less than two million tons of crude per annum. Egypt's demands are greater than those of other countries of the area, owing to her size and degree of industrialization, and she is consequently a net importer of oil—the only producing country of the Arab Middle East which is not a net exporter. Nor has the way always been made easy for the search necessary to remedy the falling-off in the main fields; the present Egyptian Government, however, seems anxious that indigenous production should be increased and many concessions have been granted in which, as in the existing areas, exploration is going forward.

Development in other countries was for many years retarded by the first world war and its effects, and by prolonged concession negotiations. A marked advance took place when the important Iraq concession of the then Turkish Petroleum Company became effective in 1925, and this country joined Iran as a potentially great producer with the



strike at Baba Gurgur near Kirkuk two years later. Export of crude had to await transport facilities, in this case the construction of 12-inch pipelines to terminals at Tripoli in the Lebanon and Haifa in Palestine (at both of which refineries were eventually constructed); but by 1934 the first million tons had been produced from the Kirkuk field. In order to expand output after the second war the construction was undertaken of 16-inch lines alongside the existing pipes; but while this development was actually proceeding, the operations of I.P.C. received a setback from the Palestine conflict in that since 1948 no oil has been pumped through the older southern 12-inch line and its 16-inch parallel, completed only to the Israeli border. The consequent reduction in exports was, however, soon more than off-set, first by the greater throughput given by the northern 16-inch line and later by the construction, completed in 1952, of a 30-inch pipeline from Kirkuk to a terminal at Banias in Syria. These ups and downs are strikingly reflected in the production figures of I.P.C., which jumped from just under a million long tons in 1934 to close on four million in 1935 when the first pipelines were in full operation, fell during the troubled period of 1941 to a million and a half long tons, were again over four million in 1947, dropped to three million in 1948, and since 1950 have steadily and dramatically risen (*e.g.* to over 24 million long tons in 1955).

Meanwhile, concessions elsewhere in Iraq had been granted in 1932 to B.O.D. (later the Mosul Petroleum Company, an Associate of I.P.C.) and in 1938 to the Basrah Petroleum Company, also an I.P.C. Associate. Despite intensive exploration, the Mosul area has never been highly productive, and export did not actually commence until 1952. Though B.P.C. explored actively from the date of the concession, it was not until after the war (during which operations were suspended) that geophysical survey ascertained the presence of fields in which drilling could begin. The most important work was carried out on the field at Zubair, and in October 1951 this activity was rewarded when oil first began to flow through a pipeline to Fao at the mouth of the Shatt-al-Arab. A small field at Khanaqin in eastern Iraq, originally in the A.I.O.C. concession, had also been developed from an early date as a producer for a nearby refinery for local consumption; the output of this plant, now Government-owned but operated by the Khanaqin Oil Company, is today supplemented by three other refineries, one of which will produce the bitumen required for the country's development programme.

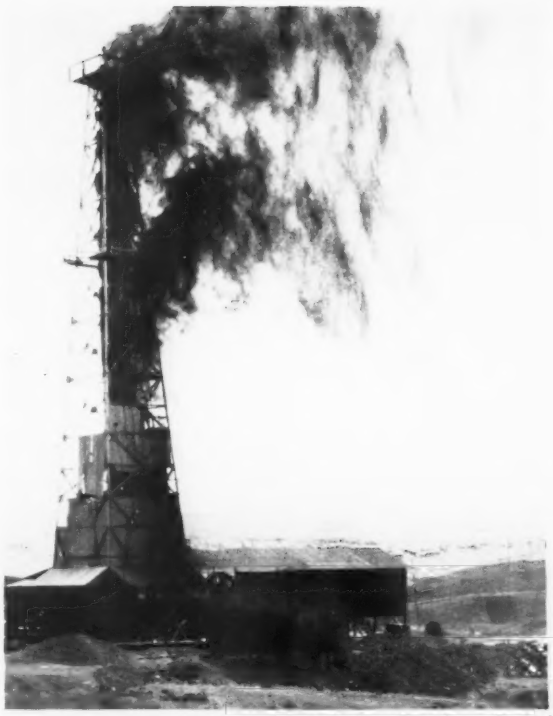


Photo by Iraq Petroleum Co Ltd

The discovery well at Kirkuk—Baba Gurgur No. 1

Third on the list of producers from the Persian Gulf-Iraq structures was Bahrain, where a concession was first granted in 1925 and eventually developed by the Bahrain Petroleum Company. Oil was struck in 1932 and production had reached the million ton level by 1937. Output of crude by this company has been held almost constant since 1946 in order to conserve the field; but the island is an important refining centre to which

The last stages in the construction of the I.P.C. 30-inch line from Kirkuk to Banias

Photo by Iraq Petroleum Co Ltd

TABLE II

OIL IN THE ARAB MIDDLE EAST

THE COMPANIES CONCERNED—TERRITORY, NATIONALITY AND CONSTITUTION

NOTE: *The criterion for inclusion of a company in this Table is that it should be engaged in exploration for or production, transit, export, or refining of crude oil: those concerned solely with local distribution of products after refining are consequently omitted.*

A. PRODUCTION

Country	*Company*	*Constituent Shareholding*	*Nationality of Participant Companies or Other Shareholders*
Bahrain	Bahrain Petroleum Co Ltd (Bapco)	Standard Oil Co of California — 50% The Texas Co — 50%	American; registered in Canada and employs many British staff
Egypt	Anglo-Egyptian Oilfields Ltd (A.E.O.)	Royal Dutch/Shell group — 30·895% British Petroleum Co Ltd — 30·895% Egyptian Government — 9·558% Private interests — remainder	British, Dutch, Egyptian, various
	Mobil Oil Egypt (M.O.E.)	Wholly owned by Mobil Overseas Oil Co	American
	International Egyptian Oil Co (I.E.O.C.) (operating through National Petroleum Co of Egypt, S.A.E., on the former Esso leases in the Wadi Feiran, in conjunction with Société Co-opérative Egyptienne de Pétrole which holds the leases)	Company registered in Panama but shareholding includes Egyptian Government, Southern California, A.G.I.P., Petrofina, a Swiss banking group, and a New York finance company, Blair Holdings	Egyptian, American, Swiss, Italian, Belgian
Iraq	Iraq Petroleum Co Ltd (I.P.C.)	D'Arcy Exploration Co Ltd (all shares held by British Petroleum Co Ltd) — 23¾% Near East Development Corporation (shares held equally by Standard Oil Co of New Jersey and Mobil Overseas Oil Co) — 23¾% Anglo-Saxon Petroleum Co Ltd (member of the Royal Dutch/Shell group — 60% Royal Dutch, 40% Shell Transport and Trading Co Ltd) — 23¾% Compagnie Française des Pétroles (35% French Government, remainder private) — 23¾% Participations and Explorations Corp (holding of the late Mr C. S. Gulbenkian—Company is registered in Panama) — 5%	British, American, French, Dutch
	Basrah Petroleum Co Ltd (B.P.C.)	As for I.P.C.	British, American, French, Dutch
	Mosul Petroleum Co Ltd (M.P.C.)	As for I.P.C.	British, American, French, Dutch
	Khanaqin Oil Co Ltd, operating on behalf of Iraq Government	Company owned by British Petroleum Co Ltd	British, operating on behalf of Iraq Government
Kuwait	Kuwait Oil Co Ltd (K.O.C.)	D'Arcy Kuwait Co Ltd (wholly owned by British Petroleum Co Ltd) — 50% Gulf Kuwait Co (wholly owned by Gulf Oil Corporation) — 50%	British, American
Neutral Zone Kuwaiti half-interest	American Independent Oil Co (Aminoil)	A group of American oil companies, not including any of the major operators, the share of the Phillips Petroleum Co being 33·54% of the whole	American
Saudi half-interest	Pacific Western Oil Corporation	American interests	American
Qatar	Qatar Petroleum Co Ltd (Q.P.C.)	As for I.P.C.	British, American, French, Dutch
Saudi Arabia	Arabian-American Oil Co (Aramco)	Standard Oil Co of California — 30% The Texas Co — 30% Standard Oil Co of New Jersey — 30% Mobil Overseas Oil Co — 10%	American

TABLE II—*contd.*

Most of the foregoing producer companies are also engaged in transit and export operations, and many in refining either for export or local use (see Table III). Virtually all are also engaged in active exploration and development. In addition the following companies are also engaged as noted: the list may not, however, be exhaustive:—

B. TRANSIT AND EXPORT (Other than by companies in A above)

Country	*Company*	*Constituent Shareholding*	*Nationality of Participant Companies or Other Shareholders*
From Saudi Arabia through Jordan and Syria to Lebanon	Trans-Arabian Pipeline Co (Tapline)	Shares held as for Aramco	American

C. REFINING (Other than by companies in A above)

Country	*Company*	*Constituent Shareholding*	*Nationality of Participant Companies or Other Shareholders*
Aden	British Petroleum Co Ltd		British
Egypt	Egyptian Government		Egyptian
Iraq . . .	Government Oil Refineries Administration (G.O.R.A.), sometimes with Khanaqin Oil Co Ltd as operator	An Iraq Government Administration	Iraqi
Lebanon . .	Mediterranean Refining Co Ltd (Medreco)	Mobil Overseas Oil Co — 50% Standard Oil Co of California — 25% The Texas Co — 25%	American

D. EXPLORATION (Other than by companies in A above)
NOTE: *May only hold concession rights and may not necessarily be active*

Country	*Detail*
Aden Protectorate . . .	A concession is held by Petroleum Concessions Ltd, an I.P.C. Associate, and geological work is in progress
Dhofar	A concession here was originally held by an I.P.C. Associate but was abandoned in June 1951. In 1953 two American companies—Cities Service Co and Richfield Oil Corp—began exploration
Egypt	Exploration and exploitation rights in Western Desert areas are held, and drilling is now being carried out, by the Sahara Petroleum Co, owned by the American companies Continental Oil Co (27½%), Ohio Oil Co (27½%), Cities Service Co (22½%), and Richfield Oil Corp (22½%). Cities Service Co also has a sole concession for an adjacent area. A prospecting agreement with the German Gewerkschaft Vereinigte Borgholzhausen is also reported
Jordan	The concession of an I.P.C. Associate having been abandoned after much geological surveying without the drilling of a test well, an agreement was signed in October 1955 between Jordan and an independent American oil producer, Mr Edwin Pauley
Lebanon	Drilling by an I.P.C. Associate behind Tripoli in 1947–8 was without success. More recently a Lebanese company, the Société Libanaise des Pétroles (a consortium of Lebanese investors and the Pacific Western Oil Corp) has been working in the Bekaa without definite results
Muscat and Oman . . .	Petroleum Development (Oman) Ltd, an I.P.C. Associate, is drilling near Jebel Fahud
Qatar, off-shore	Off-shore drilling by the Royal Dutch/Shell group began in February 1955
Syria	The Syria Petroleum Co, an I.P.C. Associate, drilled both before and after the war without success: all wells proved dry and the concession was given up in 1951. Various private concessions have now been reported but the information is confusing
Trucial Coast Land rights	Exploration is being carried out by Petroleum Development (Trucial Coast) Ltd, an I.P.C. Associate
Off-shore—Abu Dhabi . Off-shore—Dubai . .	Off-shore drilling rights are held jointly by the D'Arcy Exploration Co Ltd (⅔ interest) and the Compagnie Française des Pétroles (⅓ interest)
Yemen	Various concessions have been reported from the Yemen, the earlier being that of a German firm and the later, reported in November 1955, to an American firm, the Yemen Development Corporation of Washington (Chairman, Mr George Allen)

TABLE III

OIL IN THE ARAB MIDDLE EAST: THE PICTURE OF THE M

NOTE: *The criterion for inclusion of an item in this Table is that it shows form par refining crude oil. Details of the preliminary exploration and the subsequent l*

THE PRODUCTION OPERATION				THE TRANSIT AND EXPORT O	
Country and Operator	*Fields*	*Crude Production in 1955, thousand metric tons (Estimates, Petroleum Press Service)*	*Notes*	*Operator*	*Pipeline and Terminal Installations*
IRAQ					
Khanaqin Oil Co	Naft Khaneh	Total Iraq 33,600 of which Khanaqin Oil Co estimated at 500	Company is not at present exporting crude oil, but if it does so terms are applicable as for other Iraqi oil exports.		
B.P.C.	Zubair Rumaila		Wells on these fields are very deep. In addition to field installations there are depots and administrative headquarters at Basrah. B.P.C. undertook to attain the 8 million (long) ton per annum production level by the end of 1955, and this has been achieved.	B.P.C.	12- and 24-inch pipelines lead from gathering point at Zubair to terminal at Fao near mouth of the Shatt-al-Arab.
M.P.C.	Ain Zalah Butmah Qaiyarah	Most nearly final estimates by Companies concerned are: B.P.C. 7,230,000 long tons M.P.C. 1,280,000 long tons I.P.C. 24,200,000 long tons (net)	Only Ain Zalah and Butmah are producers for export; M.P.C. has made extensive explorations (*e.g.* 93 wells drilled up to 1941) without major results. Qaiyarah and other structures contain quantities of heavy oil, and Qaiyarah crude is being used for Government bitumen plant and has been used locally in the past.	M.P.C.	12-inch, 135-mile pipeline carries crude from Ain Zalah gathering centre to join main I.P.C. complex at K.2 (Baiji).
I.P.C.	Kirkuk Bai Hasan Jambur		Crude from the Kirkuk structures (Avanah and Baba Domes) is brought by gathering lines to stabilization plant at Baba, where also are the principal depots, and thence to tank farm at K.1. Bai Hasan and Jambur crudes do not require stabilization and as from 1 January 1956 are being piped direct to the main I.P.C. lines at K.1. Administrative headquarters are at Arrapha near Kirkuk.	I.P.C.	Main storage area at K.1 is linked by pipeline complex with Mediterranean terminals at Tripoli in the Lebanon and Banias in Syria. Parallel 12- and 16-inch lines run K.1–K.2 (Tigris)–K.3 (Euphrates), thence through four stations (T.1, T.2, T.3, T.4) to Tripoli: length 532 miles.
JORDAN					Similar 12- and 16-inch lines branch at K.3 and form the southern lines, proceeding through five stations (H.1, H.2, H.3, H.4, H.5) to Haifa (12-inch only), the 16-inch terminating at the Israeli border. Latter was never used and former has been disused since Palestine conflict.
SYRIA					
LEBANON					30/32/26-inch line follows course of northern line to near coast, then branches northwards to terminal at Banias: length 555 miles.
SAUDI ARABIA					
Aramco	Ain Dar Uthmaniya Shedgum Haradh Fadhili	46,800 (Most recent Company figure is over 47,000)	The Ghawar field is said to hold largest proven reserve of any single field in the world. There is a large gas injection plant on the Abqaiq field with a capacity of 150 million cubic feet of gas a day. Principal residential, etc., areas are at Dhahran, and there are stabilization plants at Dhahran, Ras Tanura, and Abqaiq.	Tapline	Transit of Aramco crude by 30- 31-inch pipeline of 1070 miles length from Qatif through Saudi Arabia, Jordan, Syria, and the Lebanon to a terminal at Sidon.
	All above probably form part of the one Ghawar field.			Aramco	The Ghawar fields, Qatif, Dhahran Abqaiq, etc., are all linked by a complex of pipelines leading to Tapline (above), Bahrain (below), or the terminal and refinery at Ras Tanura.
	Abqaiq Qatif Dammam Abu Hadriya Safaniya (partly under-water)			Aramco	12-inch, under-sea pipeline from Dhahran to refinery on Bahrain island.
BAHRAIN					
Bapco	Awali	1,500	Production has been maintained at same level for several years to conserve field.	Bapco	Tanker loading jetty on east side of Bahrain island.
KUWAIT					
K.O.C.	Burgan Magwa Ahmadi	55,000	Tank farm and administrative centre at Ahmadi. Burgan field is very large and comparatively shallow. Majority of Kuwait wells are dual-producers with oil flowing through casing and tubing from separate sands. A test well drilled in the northern part of the territory has shown oil.	K.O.C.	Crude is run by gravity from tank farm on the ridge at Ahmadi to export terminal at Mina al Ahmadi, 6 miles away.
NEUTRAL ZONE					
Aminoil (Kuwaiti half-interest) Pacific Western (Saudi half interest)	Wafra	1,250	Pacific Western has not actually drilled and the initial exploration and production were done by Aminoil.	Aminoil Pacific Western	Pipeline to terminal, Mina Abdullah, in Kuwait two miles south of Mina al Ahmadi. 10-inch, 32-mile pipeline from gathering centre to terminal, Mina Saud, 10 miles south of Kuwait frontier.
QATAR					
Q.P.C.	Dukhan	5,400 (Most recent Company estimate is 5,360 long tons)	—	Q.P.C.	12¾ 14- and 24-inch, 73-mile pipelines, from Dukhan to terminal at Umm Said.
EGYPT					
A.E.O.	Ras Gharib (principal)	1,800			
	Sinai fields— Sudr Asl Ras Matarma		Production of these fields is shared between A.O.E. and M.O.E.		
M.O.E.	Sudr Asl Ras Matarma		Sharp decline in Asl field since end of 1953, and Ras Matarma has very small output.		
National Petroleum Co of Egypt	Wadi Feiran Belayim		Now in small production: operating on behalf of Co-operative.		
ADEN					

TABLE III

PICTURE OF THE MAIN OPERATION—A READY REFERENCE

... it shows form part of the main operation of producing, transporting, exporting, or ... and the subsequent local distribution of products after refining are therefore omitted.

SIT AND EXPORT OPERATION		THE REFINING OPERATION		
Notes	*Operator*	*Site of Refinery or Topping Plant*	*Rated Capacity in thousand metric tons per annum*	*Notes*
	G.O.R.A. with Khanaqin Oil Co	Alwand	500	Refines Naft Khaneh crude for local distribution: bought from Khanaqin Oil Company in 1952 by Iraq Government but still operated by Company on Government's behalf.
Crude export only.	G.O.R.A. with Khanaqin Oil Co	Muftieh (Basrah)	300	Refines Zubair crude pumped into Government pipeline by B.P.C.
Crude does not require stabilization as at Kirkuk and can be added to Kirkuk crude for export from Tripoli.	G.O.R.A. . .	Qaiyarah	60 (bitumen) also rated to produce 12·5 light oil, 8·0 heavy oils, 8·5 gasoline	Produces bitumen from heavy Qaiyarah crude (M.P.C. concession area).
12-inch capacity 2·25 million long tons per annum. 16-inch capacity 5·35 million long tons per annum.	G.O.R.A. . .	Durah (Baghdad)	1,350	Went on stream 1955; refines for local distribution crude pumped by I.P.C. into Government pipeline, K.2 (Baiji)—Baghdad; additional lubricating oil plant under construction with annual capacity 25,000 tons.
	I.P.C. . . .	Baba (Kirkuk)	150	Topping plants for local use chiefly by the Company itself.
		K.3 (Haditha)	330	
Throughput 17 million long tons per annum.	I.P.C. . . .	Tripoli	580	Refines for local distribution crude taken from I.P.C. 12- and 16-inch lines running to Tripoli terminal.
	Medreco . .	Sidon	450	Refines for local distribution Saudi Arabian crude taken from Tapline.
Pipeline capacity with six pumping stations, 15–15·5 million tons per year.				
Terminal exports both refined products from Ras Tanura refinery and crude. Tapline (see above) strikes north-west from Qatif.	Aramco. . .	Ras Tanura	9,500	Refines Saudi Arabian crude, chiefly for export.
For export of products of the refinery (see next column) rather than crude: virtually all crude produced by the Bahrain field is run to the local refinery.	Bapco . . .	Bahrain	10,250	Refines Bapco crude and part of the Saudi Arabian crude, chiefly for export.
Terminal is the largest and most modern sea-loading pier in the world. A large proportion of the Gulf share of the crude is purchased by Royal Dutch/Shell which has relatively adjacent eastern and European markets. Power station and sea water distillation plant are also at Mina al Ahmadi.	K.O.C. . . .	Mina al Ahmadi	1,500	K.O.C. crude chiefly for local use and bunkering: a large expansion of the refinery to close on 9000 is planned, with extensions to power and water supply, oil loading system, etc., to be completed towards end of 1957.
All production at first was exported through Aminoil facilities; but Pacific Western concession does not allow use of a pipeline outside the Neutral Zone, hence construction of Mina Saud early in 1955. Export has been to Japan and elsewhere but most significantly to the United States, a first load of 100,000 barrels having been landed at Houston in February 1954.				
Almost all crude is exported.	Q.P.C. . . .	Umm Said	30	Topping plant for local use using Dukhan crude
	A.E.O. . . .	Suez	2,000	Processes Shell crude from the various fields plus an import of crude which commenced December 1954, together with M.O.E.'s share of Sinai crude.
	Egyptian Government .	Suez	1,300	Refines Government royalty share of A.E.O. and M.O.E. crudes together with any output of National Petroleum Co of Egypt, etc. N.B. There is a Government pipeline (formerly British Army) for transport of refined products from Suez to Cairo.
	B.P. . . .	Little Aden	5,000	Went on stream August 1954; refines imported Persian Gulf crude, chiefly for re-export and bunkering.

large quantities of crude are run from the Aramco fields in Saudi Arabia: moreover, "the discovery of oil on Bahrain island . . . had a significance which transcends the immediate importance of Bahrain production, since this was the first oil discovery in the southern Persian Gulf, and stimulated American interest in the Saudi Arabian mainland".[1]

The years immediately preceding the second world war were, in consequence of this lead, marked by great concession and exploration activities in the Persian Gulf; the first Saudi Arabian agreement was signed in 1933 after the interest of Standard Oil of California had been raised in the mainland by the Bahrain success, the Kuwait concession was granted to the Kuwait Oil Company in 1934, and that in Qatar to an Associate of I.P.C. in 1935, to mention only the leading winners in the exploration stakes. The expansion of the first two has been stupendous. Geological work on the Dammam Dome in Saudi Arabia started only a few months after the concession was granted, and drilling in 1935. Results were at first disappointing until deeper drilling in 1937 yielded large quantities of oil; development of facilities began in 1938 and the first tanker called at Ras Tanura in May 1939. The early years of the war were quiet; but in consequence of anxiety at the drain on the fields of the United States, American Government interest in the expansion of the Saudi Arabian development later became marked, and it was decided to build a refinery, new loading facilities, and a submarine pipeline to Bahrain where the Bapco refinery was to be expanded. The Ras Tanura refinery and the Bahrain pipeline were in operation before the end of 1945, and both refineries are now large by any standards. The facilities of Aramco have continuously been enlarged as one great field after another has been discovered, the most striking development being the construction of the 1070-mile trans-Arabian pipeline to Sidon in the Lebanon, one of the most recent the installation of a gas injection plant on the Abqaiq field. From 1945 onwards crude production has leapt every year until it has recently stabilized at about the 47 million metric ton level.

Drilling in Kuwait began in 1936 and was transferred in 1937 to the Burgan area where oil was struck the following year. Drilling had to be suspended and the wells plugged during the war owing to the danger of the over-running of the Middle East, and operations were not resumed until the end of the war in Europe, the first commercial shipments of crude being made in June 1946. The Burgan field has proved one of the largest and most productive in the world and an immense output has been built up, rising from about two million metric tons in 1947 to an estimate of 55 million metric tons in 1955. In this short period so rapid has been the expansion that by June 1954 the ten-thousandth tanker had sailed from Kuwait with a cargo of bulk oil, loading like its fellows at what is now the largest crude oil loading pier in the world. This Company also has a refinery, of which an important expansion is planned, and like all the Middle East oil operators has been obliged to provide its own substantial services.

Further down the Gulf, in Qatar, the first well was drilled in 1937 and the field at Dukhan discovered in 1940. Production for export commenced after the war, when a pipeline was built to an oil port at Umm Said, and is now over five million metric tons per annum. Today the latest addition to the roll of producers is the barren Neutral Zone, ownership of which is shared by Kuwait and Saudi Arabia and in which two American companies hold the rights of each of the Rulers. Production from this new source began less than three years ago, and was brought in 1955 to over a million and a quarter tons. Equally recent is the erection of two further refineries, one small and one large, at Sidon and Aden, the latter owned and operated by British Petroleum.

It is not necessary in the present study, which is not a historical review, to give more than the above summary of the history of oil in the Middle East, to describe the intensive and often fruitless exploration which continues in many territories other than those named, or to enter into the complicated steps whereby the companies which first commenced operations have arrived at their present constitution and have become multi-national; the reader who wishes to enter into further detail on these subjects may be referred to the excellent historical coverage in Brigadier S. H. Longrigg's *Oil in the Middle East*. We are rather concerned here with the picture into which the oil operation has settled today; and while much of this is well-known it is thought relevant to present at this point in handy tabular form a check list of the companies now involved in the main operation in the region and of their constitution and nationality (Table II). The criterion for inclusion of a company in this list is that it should be engaged in the production, transit, export, or refining of crude, or in exploration activities. Thus purely local distribution companies have been omitted; in regard to exploration, the list can hardly be said to be exhaustive, though it may be useful. In Table III is given a summary of the main Middle East operation; here again the Table is concerned with describing only the production, transit and export, and refining of crude oil and does not deal with local distribution since the provision of fuel for the development of industry and transport will be dealt with in a later section. In accordance with our definition of the region for the purposes of this study neither Table takes account of Iran, Turkey or Israel.

Whether or not it is correct to describe the rise of the petroleum industry in the Middle East as "the great industrial revolution of our time"[2] when its competitors for that title include the development of automation, of atomic energy, and of oil in the world as a whole, its sudden growth is certainly the most striking *local* industrial development in the world today. And the picture which is presented by the preceding Table is that of an industry not only noteworthy by contrast, in wealth and modernity, with the region in which it has appeared, but gigantic in its absolute size and productivity.

A United Nations survey[3] estimates that by 1954 the cumulative gross investment in properties, plant, and equipment, before depreciation, in the oil industry of the Middle East (including Iran) was of the order of $2,200 million. A glance at the production figures for the region set out in Table IV will show that this sum has not been ill-invested. Output of crude by the Arab Middle East region has risen from less than six million metric tons in 1938 to an estimated figure of 145 million metric tons in 1955; and almost all of this rise has occurred since the war, particularly large increases having taken place in 1946 when Saudi Arabia commenced to be a major producer, in 1948 and 1950 with the rapid expansion of Kuwait, in 1951 when the impact of the Persian Gulf-Iraq producers rose to meet the fall in output from Iran, and in 1952 when the opening of the 30-inch pipeline resulted in a dramatic leap in Iraq's production. Indeed in all recent years there has been a general rise in the output of the major producing countries. Owing to the set-back resulting from the nationalization of Iranian properties in the middle of 1951, the rate of climb in the Middle East as a whole, including the countries not covered

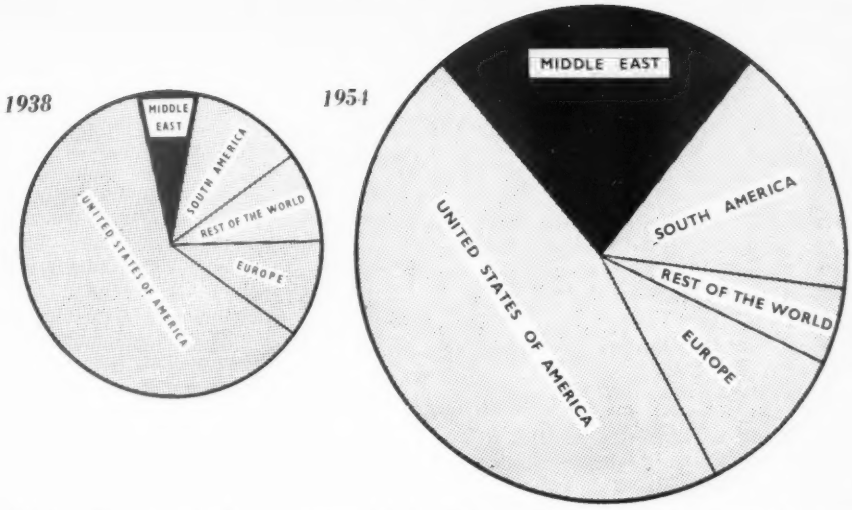


Fig 1. *Middle East Oil in the World Market—a comparison*

By courtesy of *Iraq Petroleum*

in this study, has been more even, but is still very marked; the 1955 estimate of total regional output is in fact exactly ten times that achieved in 1938.

There are several reasons for this immense expansion. Consumption of petroleum products is continually rising throughout the world; and particular elements in this rise in demand which have directly affected the Middle East are the growth in the use of oil products in Europe and the Eastern Hemisphere and the parallel conversion of the United States, the world's greatest producer and consumer of petroleum, into a net importer. The rise in demand has been matched by opportunity, for at the very time when these factors were operating, intensive exploration was having its reward in the discovery in the region of new fields of abnormal size, fields on which the production costs are comparatively moderate—a factor which off-sets the long tanker haul and the cost of construction and maintenance of the great pipelines required to take the oil to its markets. With a ready source of supply and a growing demand both present, it is by a natural process that handling facilities have been greatly expanded, and that thus all the factors necessary for an extraordinary rise in production have operated at once.

Not only is the rise in Middle East production striking in itself, but it has also out-stripped the increase in the rest of the world. As indicated in Table IV, only 5·9 per cent of world production in 1938 came from the whole Middle East including Iran, and of the region's share close on two-thirds actually came from that country. By 1947 the equivalent figure was just over 10 per cent, by 1950, 16·7 per cent, and by 1954, 20 per cent—almost the whole of which came from

TABLE IV
CRUDE OIL PRODUCTION—MIDDLE EAST
Thousand Metric Tons

Country	1938	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955 Estimates
Kuwait	—	—	800	2,200	6,400	12,378	17,291	28,226	37,637	43,286	47,723	55,000
Saudi Arabia	67	2,872	8,200	12,300	19,260	23,471	26,197	37,200	40,509	41,382	46,875	46,800
Iraq	4,364	4,462	4,607	4,478	3,427	4,200	6,480	8,630	18,843	28,211	30,667	33,600
Qatar	—	—	—	—	—	100	1,632	2,364	3,297	4,062	4,778	5,400
Egypt	223	1,344	1,282	1,332	1,914	2,280	2,340	2,333	2,350	2,350	1,995	1,800
Bahrain	1,137	980	1,100	1,300	1,500	1,508	1,512	1,509	1,507	1,504	1,505	1,500
Neutral Zone	—	—	—	—	—	—	—	—	—	—	851	1,250
Total Arab Middle East (region as defined in this study)	5,791	9,658	15,989	21,610	32,501	43,937	55,452	80,262	104,143	120,795	134,394	145,350
Iran	10,359	17,109	19,479	20,418	25,269	27,235	32,258	16,838	1,040	1,345	3,000	16,000
Turkey	—	—	—	—	—	16	17	19	22	26	59	200
Total Middle East*	16,150	26,767	35,468	42,028	57,770	71,188	87,727	97,119	105,205	122,166	137,453	161,550
World Total	271,600	353,200	375,100	413,500	470,900	469,300	524,800	590,000	621,200	655,900	685,800	763,100
Total Middle East production as percentage of world production	5·9	7·6	9·5	10·2	12·3	15·2	16·7	16·5	16·9	18·6	20·0	21·2

Source: Petroleum Press Service

*As in *Petroleum Press Service* tables: these totals are comparable with the total of A + B in Table VI below, "World Crude Oil Reserves", and with the final totals in Table V, "Output of Major Refinery Products".

TABLE V

OUTPUT OF MAJOR REFINERY PRODUCTS—MIDDLE EAST

Thousand Metric Tons

Country and year	*Motor Spirits*	*Kerosine*	*Heavy Oils*	*Total Major Products*
Aden				
1954	117	42	979	1,138
Bahrain:				
1938	302	136	475	913
1946	927	513	2,602	4,042
1950	1,754	705	4,382	6,841
1952	2,255	1,142	5,418	8,815
1953	2,119	1,100	6,540	9,759
1954	2,146	1,017	6,610	9,773
Egypt:				
1938	95	18	168	281
1946	188	67	685	940
1950	200	151	1,760	2,111
1952	186	218	1,823	2,227
1953	186	208	1,802	2,196
1954	206	207	1,817	2,230
Iraq:				
1938	22	20	74	116
1946	40	56	103	199
1950	67	77	252	396
1952	92	107	489	688
1953	120	125	618	863
1954	113	114	615	842
Kuwait:				
1950	15	5	1,081	1,101
1952	21	9	1,321	1,351
1953	36	11	1,471	1,518
1954	42	12	1,403	1,457
Lebanon:				
1946	51	27	150	228
1950	98	61	235	394
1952	114	66	281	461
1953	112	64	311	487
1954	110	64	360	534
Saudi Arabia:				
1946	732	13	2,955	3,700
1950	982	380	3,598	4,960
1952	1,443	643	6,109	8,195
1953	1,562	977	7,362	9,901
1954	1,698	688	7,904	10,290
Total Arab Middle East as above (region as defined in this study)				
1938	419	174	717	1,310
1946‡	1,938	676	6,495	9,109
1950	3,116	1,379	11,308	15,803
1952	4,111	2,185	15,441	21,737
1953	4,135	2,485	18,104	24,724
1954	4,432	2,144	19,688	26,264
Iran:				
1938*	1,821	478	4,578	6,877
1946*	4,566	1,719	10,758	17,043
1950	4,571	2,300	17,794	24,665
1952‡	271	200	861	1,332
1953‡	260	179	796	1,235
1954†	455	312	1,539	2,306
Israel:				
1950	31	27	129	187
1952‡	145	113	546	804
1953‡	161	103	603	867
1954	158	133	591	882
Turkey:				
1950	1	—	4	5
1952	1	—	4	5
1953	1	—	4	5
1954†	1	—	4	5
Total Middle East:				
1938	2,240	652	5,295	8,187
1946‡‡	6,504	2,395	17,253	26,152
1950	7,719	3,706	29,235	40,660
1952	4,528	2,498	16,852	23,878
1953	4,557	2,767	19,507	26,831
1954	5,046	2,589	21,822	29,457

Sources: United States Department of the Interior, Bureau of Mines. *World Petroleum Statistics:* partly reproduced in United Nations publication, "Economic Developments in the Middle East, 1945–1954", pp. 4 and 5.

*Exports.

‡ Partly or wholly estimated.

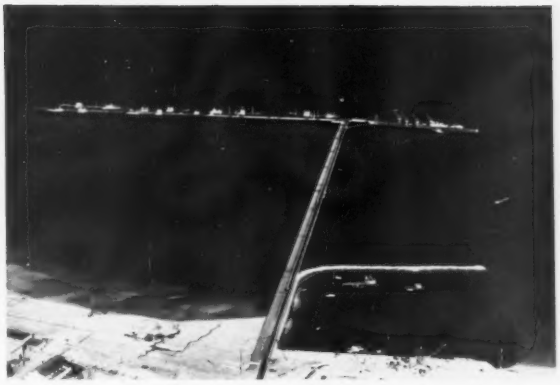
‡‡ Excluding Palestine

the Arab Middle East since for the bulk of that year the Iranian industry was in eclipse. In 1955, it is estimated, the total production of the Middle East, nearly one-tenth of which has come from Iran, has been 21·2 per cent of world output; and the absolute increase in regional production over the preceding year (24 million metric tons) was a record figure. Regarded from another angle, production in the Free World (not whole world) has nearly doubled since 1946—but the increase in the Middle East has been some 360 per cent; it is also noteworthy that in 1955 the share of the United States in Free World production has for the first time fallen to less than 50 per cent, while the Middle East now accounts for over 25 per cent.[4] This "bigger slice of a bigger cake" which Middle East output represents on a comparison of whole world production for 1938 with that for 1954, is strikingly evident in Fig. 1.[5] Certainly "the centre of gravity of world oil production is shifting from the Gulf-Caribbean area to the Middle East and is likely to continue to shift until it is firmly established in that area"; this celebrated remark by Dr de Gollyer, leader of the United States Petroleum Commission to the Middle East, is as true today as when it was made in 1944, and is clearly much nearer fulfilment. This shift is particularly important to Europe, to which in 1954 came from Middle East countries about nine-tenths of the total crude processed in its refineries.

The fact that crude rather than refined spirit is so largely sent to Europe is of significance within the Middle East itself; in the words of the United Nations survey,[6] "the relative importance of the Middle East refining industry during the post-war period declined". Though the figures given in Table V are substantial it will be seen that the output of the refineries has in the last few years risen rather slowly and at a rate not in any way commensurate with the progress of crude production. The refining capacity of the region certainly increased markedly with the construction of new units and expansion of others, so that the total annual capacity rose from 41·5 million tons in 1947 to 62 million tons in 1954; but this was a rise of only 49 per cent as com-

pared with a 221 per cent increase in crude production in the same period.[6] The United Nations report continues: "This relatively slow progress in expanding refining capacity reflects the fact that, for various strategic, economic, and financial reasons, in the post-war period refineries have been increasingly set up in consuming centres rather than in the Middle East . . . consequently, the share of the Middle East in world output of refined products declined from 8·7 per cent in 1947 and 1950 to 4·5 per cent in 1953"[7]. But with Aden recently on stream and the Kuwait Oil Company about to expand its Mina al Ahmadi refinery into a major installation, the decline is certainly not absolute.

This merely relative drop in refining importance is not in any case likely to cause many sore heads in Arab capitals, for not only is crude production more than making up for it but the promise of the gigantic proved reserves should also provide sweet dreams for many years to come. This promise is clearly illustrated by Table VI, in which the comparison with the rest of the world is much more striking than in the case of production. In the latest estimate of reserves given in that Table it will be seen that the Arab Middle East is estimated to hold almost one hundred thousand million U.S.



A B P photo

Kuwait Oil Company oil jetty at Mina al Ahmadi —the largest of its kind in the world

TABLE VI

WORLD CRUDE OIL RESERVES

Area	*Estimated Reserves at 1 January* 1954 *(in thousand million U.S. barrels)*	*Col. 2 Estimates as Percentages of estimated World Total*	*Estimated Reserves at 31 December* 1955 *(in thousand million U.S. brl.)*	*Col. 4 Estimates as Percentages of estimated World Total*
1	2	3	4	5
A. Arab Middle East:				
Saudi Arabia	30·8	18·9	37·0	19·6
Kuwait	30·0	18·5	40·0	21·2
Iraq	14·1	8·7	20·0	10·6
Qatar	1·4	0·9	1·5	0·8
Bahrain, Neutral Zone, Egypt, Trucial Coast, etc.	0·5	0·3	0·8	0·4
Total, Arab Middle East (region as defined in this study)*	76·8	47·3	99·3	52·6
B. Iran	27·1	16·7	27·0	14·3
Total, Middle East (A+B)*	103·9	64·0	126·3	66·9
C. Other Eastern Hemisphere	13·7	8·4	15·2	8·1
Total Eastern Hemisphere (A+B+C)	117·6	72·4	141·5	75·0
D. U.S.A.†	29·3	18·1	29·6	15·6
E. Other Western Hemisphere†	15·5	9·5	17·7	9·4
Total Western Hemisphere (D+E)	44·8	27·6	47·3	25·0
Total World (A+B+C+D+E)	162·4	100·0	188·8	100·0

Sources: Column 2 (1 January 1954)—Table of estimates accompanying article by G. M. Knebel on "World Crude Oil Reserves", *World Petroleum*, Jan 1955, pp 32–34; see also *Petroleum Press Service*, April 1955, p 122, and Supplement "Oil and Social Change in the Middle East", *The Economist*, 2 July 1955, p 8: Column 4 (31 December 1955)—Table of estimates and proved reserves, in survey by P. Swain and R. G. Gibson, "World-Wide Oil Report", *Oil and Gas Journal*, 26 December 1955, pp 141–142.

* It will be noted that these totals include Egypt which is sometimes excluded from the Middle East in comparable tables: since this country's reserves are estimated at only 0·11 to 0·15 thousand million U.S. barrels, this inclusion makes almost no difference to the rounded total (which, for the whole Middle East, for example, is 126·2 in the *Oil and Gas Journal* estimate as against 126·3 in column 4 above). Figures for Turkey and Israel are even smaller so that their addition to B would not affect the total of A+B. Thus the second total, "Total Middle East", is for all practical purposes perfectly comparable with "Total Middle East" in Tables IV and V, of which the former covers the Arab Middle East including Egypt with Iran and Turkey added (there being as yet no production in Israel), while the latter similarly combines the figures for the Arab Middle East (including Egypt) with those for Iran, Israel, and Turkey.

† Figures for U.S.A. and Canada in column 4 are as at the end of 1954.

barrels, more than two-thirds of the total Eastern Hemisphere reserves, which in turn are almost exactly three times those of the Western Hemisphere. The Arab Middle East thus holds over half of the worlds reserves; the Middle East as a whole holds over two-thirds of them.

This vast expansion of output and this promise for the future have today four main results in the economy of the region. In the first place, the two taken in conjunction have greatly increased the strategic importance of the area, which is rapidly nearing the position when it will play an irreplaceable part in the world economy. Secondly, oil is now in the Middle East an industry of gigantic proportions, both absolutely and, even more, relatively—it is indeed *the* industry in most countries. A further effect is that there is now an abundant local fuel supply in a large part of the region. Finally, great revenues are pouring into State coffers, and this rise has been made sharper by the revision of agreements (details of which are not necessary in this part of the study) so that a double impetus is given to the flow of wealth. With the first of these effects we are not concerned in this study, though it must be a constant background to it. With the second we shall deal in Part III, which is concerned with the direct effect of the oil companies, with the third in Part IV ("Fuel and Power"), and with the last in the concluding sections.

References

[1] "Review of Middle East Oil", ed. C. T. Barber, *Petroleum Times*, 1948, p. 69.
[2] *Financial Times*, 5 February 1954.
[3] "Economic Developments in the Middle East, 1945–1954", p. 2. United Nations.
[4] *Petroleum Press Service*, January 1956.
[5] Reproduced from an article on "Middle East Oil in the World Markets", C. T. Barber, *Iraq Petroleum*, **5** (4), November 1955, p. 6.
[6] "Economic Developments in the Middle East, 1945–1954", p. 2.
[7] *Ibid.* p. 6.

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Chemical Production at Grangemouth

The Grangemouth plant of Grange Chemicals Ltd came into operation during the last quarter of 1955 and it is producing detergent alkylate at its design output of over 10,000 tons per annum.

Formed in 1955, Grange Chemicals Ltd is jointly owned by British Hydrocarbon Chemicals Ltd (jointly owned by The British Petroleum Co Ltd and The Distillers Co Ltd) and the Oronite Chemical Co (wholly owned subsidiary of The Standard Oil Co of California).

The Product and Raw Materials

The plant product is dodecylbenzene (tetrapropylene benzene or detergent alkylate), which is a colourless, odourless liquid boiling between 280° and 300° C. It is slightly viscous, relatively inert, and convertible to a wetting agent and detergent by reaction with sulphuric acid and neutralization.

The sulphuric acid product is reacted with caustic soda to form sodium dodecylbenzene sulphonate, the main active ingredient in most synthetic detergent powders.

Raw materials are propylene tetramer and benzene, and these are converted to dodecylbenzene by a continuous catalytic process using anhydrous liquid hydrofluoric acid. This Oronite process is covered by patents owned by the California Research Corporation.

Propylene tetramer is made in the adjoining petroleum refinery by polymerization of propylene and will also be made in a new plant under erection by British Hydrocarbon Chemicals Ltd. Pure coal tar benzene is obtained from indigenous sources.

The Plant

The plant, which cost about £1 million, was designed on Oronite process data by the Stone & Webster Engineering Corporation of New York, but the equipment was mainly purchased and fabricated in the U.K. Procurement and supervision of construction was carried out by E. B. Badger & Sons Ltd and site erection by Costain John Brown Ltd. It is located within the factory area of British Hydrocarbon Chemicals Ltd and draws essential services from the main factory.

The detergent alkylate plant at Grangemouth.

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PETROLEUM IN PARLIAMENT

Oil Companies' Control of Filling Stations

During Question Time in The House on 26 January Mr H. Wilson asked the President of the Board of Trade if he would refer to the Monopolies Commission the activities of the oil companies in connexion with the distribution of petroleum in the United Kingdom and, in particular, their purchase of and control over a high proportion of the petrol filling stations. Mr Wilson referred to an article in a recent copy of *The Economist* (14 January) dealing with this matter and asked the President of the Board of Trade to take into account the effect upon the distribution of oil, petrol and, above all, accessories, by the practice of oil companies buying up one station after another and "tying them all up".

Mr Peter Thorneycroft said in reply that he was not proposing for the time being to make any further references to the Commission. He was however, considering the points put to him by the Right Hon. Gentleman.

Personal Notes

The Right Honourable Lord Geddes, President-Designate of the Institute of Petroleum, has accepted an appointment as Tanker Adviser to the P & O Group of Companies. The appointment arises from the decision of the P & O Group, announced in September last year, to build a fleet of tankers to meet the growing demand for oil carriers.

Some 500,000 dw tons of tankers are being ordered for delivery between 1958 and 1960 and they will be owned and operated by a number of companies in the P & O Group.

Sir Frederick Godber, whose elevation to a barony was announced in Her Majesty's New Year Honours List, is to assume the title of Lord Godber of Mayfield.

S. V. Campbell, has retired from his position as representative and purchasing agent of Aramco Overseas Company in London and has been succeeded by **L. Dutro.**

C. J. Wright, a British oil consultant who worked for many years with the British Petroleum Company, has been asked by the Iranian Government to act as adviser on the expansion of existing refinery facilities in North West Iran.

Mr Wright has also been asked by an International Group to act as consultant for a new refinery project in North West India.

K. C. McCarthy, formerly assistant manager of the Castrol Division of C. C. Wakefield & Co Ltd, has been appointed sales promotion manager and deputy to C. E. R. Millidge, manager of the Castrol Division. **E. E. Hughes** has been appointed assistant manager, Castrol Division. He has been succeeded as sales manager Mid West Region by **J. Pickering.**

D. W. Burnand, B.Sc., A.M.I.E.E., of Wakefield-Dick Industrial Oils Ltd, has been appointed sales manager of the Electrical Division.

H. R. Walton, B.Sc., M.Inst. Pet., sales manager of the Fisher Governor Co Ltd, has been appointed a director of the Company.

S. Warr has retired from the Mobil Oil Company after 34 years' service as an industrial salesman in the Manchester area. At a luncheon given in his honour by R. T. Campbell, manager of the Northern Industrial Division, Mr Warr was presented with a wrist watch as a mark of his colleagues' good wishes for his retirement.

Mr Warr's family has a record of service in the Company, his father having spent twenty-one years as a representative in the Barnsley area, and his uncle, Mr Elborough, having been an industrial salesman in Nottingham.

K. C. Woodhead has been appointed technical service manager, Fuel Oil Department, at the Head Office of Fina Petroleum Products Ltd.

A. W. Wooldridge of the Esso Petroleum Company has been appointed deputy general sales manager. Mr Wooldridge joined the Company in 1923 and after four years at the Leeds Branch Office was appointed in 1927 to a post in the Lubricating Oils Department, of which he became manager in 1929. From 1937 to 1939 he was assistant to the general sales manager at the London Head Office, before being promoted to manager, Northern Division.

After a period of service with the Petroleum Board till 1948, Mr Wooldridge returned to the Manchester Office as divisional manager.

In 1952, he returned to Head Office as assistant general sales manager; and in January 1955, following a reorganization of the General Sales Department, he became regional manager, with responsibility for two marketing divisions as well as for certain other Head Office marketing operations.

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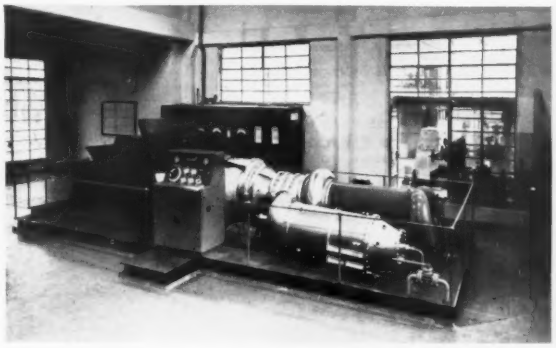
ITALIAN GAS TURBINE INSTALLATIONS

A gas turbine produced by Ruston & Hornsby Ltd has been installed at the Cortemaggiore refinery of A.G.I.P. Mineraria in northern Italy.

Expansion of the refinery (which exploits northern Italy's supplies of natural gas) called for additional power and steam supply, and the Ruston TA gas turbine now takes the main load, running in parallel with the four Worthington 350kW gas engines which previously supplied the refinery.

Process steam is provided by utilizing the turbine exhaust heat by means of an exhaust heat boiler with economizer.

Methane gas was not available in sufficient quantity in



England for the works tests to include continuous running on the actual type of fuel available on site. Early site tests did, however, provide an opportunity to test the gas turbine on continuous service with natural gas fuel, and minor modifications were then made.

A second Ruston TA gas turbine alternator set has been installed in Italy at San Donato, and the increasing exploitation of natural gas throughout the world is now widening the field of application for industrial gas turbines.

Changes in BP Board

It was announced recently by the Board of The British Petroleum Co Ltd that Lord Strathalmond, C.B.E., LL.D., had indicated that he wished to retire from the chairmanship of the Company on 31 March when he will have completed 33 years' service as a director of the Company, for 28 years of which he has been chairman or deputy chairman.

The Board has regretfully acceded to Lord Strathalmond's wish and has appointed Basil R. Jackson, the present deputy chairman, to be chairman, and Neville A. Gass, C.B.E., M.C., to be deputy chairman from 1 April 1956.

The Hon. Maurice R. Bridgeman, C.B.E., is to fill the vacancy on the Board caused by Lord Strathalmond's retirement.

Lord Strathalmond of Pumpherston was created a baron in Her Majesty's list of New Year Honours in 1955. As the son of the founder of Scotland's leading shale oil company, Lord Strathalmond found himself in his middle twenties in charge of a growing oil business. Having successfully formed Scottish Oils Ltd—a central selling organization combining the forces of the Scottish shale oil industry, Lord Strathalmond joined the Board of the Anglo-Persian Oil Company under whose aegis Scottish Oils Ltd had been formed. He became deputy chairman of the Anglo-Persian Oil Company in 1928 and succeeded Lord Cadman as chairman in 1941.

Lord Strathalmond was a member of the wartime Petroleum Board and was a member of the 1944 British Oil Delegation which visited the U.S.A. to discuss an Anglo-U.S. oil agreement.

In latter years, Lord Strathalmond has been occupied with the settlement of the Persian oil dispute and with the reorganization of BP's business which was necessitated by the suspension of Persian operations. In 1954 he played a leading part in the formation of the consortium by which the Persian dispute was settled.

N. A. Gass

Lord Strathalmond was the first recipient of the Cadman Memorial Medal of the Institute of Petroleum.

Mr Basil Jackson joined the Anglo-Persian Oil Company in 1921 after qualifying as a Barrister-at-Law. After working in the Production Department of the London office until 1929, he visited the United States and in 1930 opened the Company's office in New York as its representative in the U.S.A. He returned to London in 1935 to take charge of the English oilfield operations but soon after the beginning of the second world war he again took charge of the Company's New York office.

Basil Jackson

Mr Jackson was appointed a director of the Company in 1948 and returned to London to become a managing director in 1949 and deputy chairman in 1950.

Mr N. A. Gass joined the Anglo-Persian Company in 1919 and served in Persia until 1934, latterly as deputy general manager. In 1934 he was transferred to the London office and has been a managing director of the Company since 1939.

The Hon. M. R. Bridgeman joined the Anglo-Persian Oil Company in 1926 and, after two years in Persia, worked in the London office until the second world war, except for the period 1934-7 when he was in charge of the Company's New York office.

In 1939 Mr Bridgeman was Petroleum Adviser to the Ministry of Economic Warfare, and in 1940 he became assistant secretary of the Petroleum Department and joint secretary of the Oil Control Board. In 1942 he was seconded as Petroleum Adviser to the Government of India. From 1944 to 1946, when he rejoined the Anglo-Persian Oil Company, he was principal assistant secretary of the Petroleum Division of the Ministry of Fuel and Power.

The Hon. M. R. Bridgeman

The British Petroleum Company and its subsidiaries were active the world over in 1955, *their operations ranging from geological survey work in the Rocky Mountains of Canada* (top left) *to similar work in Papua, where a survey team is seen* (bottom left) *passing through Harisuku village near Kuru. Offshore drilling in the Gulf of Paria six miles off the south-west coast of Trinidad* (centre), *compares with operations in the U.K., where drilling was continued at Plungar, Leicestershire* (left centre). *Distribution of petroleum products by road tanker under the shade of the palm trees at Lagos, West Africa* (right centre), *compares with similar operations in North Island, New Zealand* (bottom right), *with the* 7500-*ft volcano Ngauruhoe in the background. In the tanker world, officers and cadets from the Nautical Training College, Pangbourne, are seen* (top right) *on the flying bridge of the* 32,000-*ton tanker* British Victory.

Record World Oil Production in 1955

1955 showed the largest increase in oil production throughout the world ever recorded. Estimated figures published by *Petroleum Press Service* show that the world's crude oil output rose by 77 million tons, reaching a total for the year of 763 million tons. Production in the free world over the last 30 years has advanced at an average annual rate of about 5½ per cent but the increase during 1955 was over 10 per cent.

There were record increases in 1955 over the preceding year in the Middle East, Venezuela, Canada, Western Europe, and Russia. In the U.S.A., where production dropped by 5½ million tons in 1954, there was an increase equivalent to 6·6 per cent. This was, however, proportionately much smaller than in all other major regions except the Far East, and as a result America's share in the free world's total production has fallen, for the first time, to less than 50 per cent. The Middle East now accounts for nearly one quarter, and the Caribbean area for well over one sixth.

Petroleum Press Service draws attention also to the growing list of oil-producing countries, now numbering 46. Exploration is being carried out extensively and as time passes the new producing areas will ensure the continuation of the upward trend of production to meet the world's rising demands.

WORLD: ESTIMATED CRUDE OIL PRODUCTION
(Thousand Metric Tons)

	1953	1954	1955	1955 % Increase over 1954	1955 % of World Total
North America					
U.S.A.: California	49,000	47,958	47,900		
East of California	268,757	264,299	284,900		
	317,757	312,257	332,800	6·6	43·7
Canada	10,837	12,935	17,000	31·4	2·2
	328,594	325,192	349,800	7·6	45·9
Latin America—Caribbean Area					
Venezuela	92,261	98,586	111,000		
Colombia	5,507	5,792	5,600		
Trinidad	3,245	3,398	3,450		
	101,013	107,776	120,050	11·9	15·8
Other Countries					
Mexico	10,207	11,729	12,800		
Argentina	3,994	4,238	4,450		
Peru	2,107	2,272	2,300		
Ecuador	391	420	450		
Bolivia	78	216	350		
Chile	164	226	320		
Brazil	121	136	240		
Cuba	6	13	40		
	17,068	19,250	20,950	8·6	2·7
Middle East					
Kuwait	43,286	47,723	55,000		
Saudi Arabia	41,382	46,875	46,800		
Iraq	28,211	30,667	33,600		
Persia	1,345	3,000	16,000		
Qatar	4,062	4,778	5,400		
Egypt	2,350	1,995	1,800		
Bahrain	1,504	1,505	1,500		
Kuwait Neutral Zone	—	851	1,250		
Turkey	26	59	200		
	122,166	137,453	161,550	17·5	21·2
Far East					
Indonesia	10,225	10,598	11,100		
Br. Borneo	4,955	4,903	5,300		
New Guinea	262	550	480		
India	266	299	350		
Japan	290	304	320		
Pakistan	236	274	280		
Burma	156	202	220		
	16,390	17,130	18,050	5·0	2·4
European Region					
Austria	3,200	3,400	3,700		
Germany	2,189	2,666	3,150		
Netherlands	820	939	1,020		
France	369	508	870		
Morocco/Algeria	187	193	160		
Yugoslavia	172	216	260		
Italy	86	69	200		
U.K.	56	60	55		
	7,079	8,051	9,415	17·0	1·2
FREE WORLD					
Western Hemisphere	446,675	452,218	490,800	8·5	64·4
Eastern Hemisphere	145,635	162,634	189,015	16·4	24·8
	592,310	614,852	679,815	10·5	89·2
Eastern Europe and China (*a*)					
U.S.S.R.	52,800	59,280	70,000		
Rumania	9,000	9,400	10,575		
Hungary	830	1,208	1,500		
Albania	170	200	220		
Poland	190	200	200		
Czechoslovakia	135	140	140		
Bulgaria	—	—	(*b*)		
China	472	513	667		
	63,597	70,941	83,302	17·5	10·8
WORLD TOTAL	655,907	685,793	763,117	11·2	100·0

(*a*) U.S.S.R. figures for 1953 and 1954 are official; other figures for these regions are based, as far as possible, on official indications. Figures for China may include small quantities of shale oil.
(*b*) Not available but probably small.

Trade Literature, etc.

British Hydrocarbon Chemicals Limited

British Petroleum Chemicals Limited has announced that the name of the Company has been changed to British Hydrocarbon Chemicals Limited.

There is to be no alteration in the nature and scope of the Company's activities, which remain the production of chemicals from petroleum.

The Company operates a petroleum chemical factory at Grangemouth, Scotland, and is owned by The British Petroleum Co Ltd and The Distillers Co Ltd.

Automatic Karl Fischer Titrations

An instrument for carrying out Karl Fischer titrations automatically is to be produced by Baird & Tatlock (London) Ltd. A comparatively unskilled operator can place the sample in the apparatus, start the process, and take the readings. The actual process of titration is automatic and stops when the end point is reached.

Technical Bulletins

Mobil Oil Company has recently started to issue industrial technical bulletins, which are primarily intended to keep their engineers and salesmen in touch with the latest information on products, developments, and lubrication problems. Each bulletin consists of four pages and the first six are entitled: S.V. Ceremuls; Industrial Petrolatums; Gargoyle Grease BRB No. 1 and Ball and Roller Bearing Lubrication; The Gargoyle Compounds and Enclosed Gear Lubrication; Oils for the Machine Shop; The Gargoyle Dorcias and Open Gear Lubrication.

U.K. TEL Exports

Exports of tetraethyl lead from the U.K. in 1955 totalled 5,460,710 gallons, an increase of 2,084,580 gallons or 61·7 per cent over the 1954 figure of 3,376,130 gallons. The corresponding value was £4,432,940 higher at £11,647,717, the average f.o.b. value being practically the same (£2 2*s.* 8*d.* per gallon) in both years.

New Flameproof Limit Switch

Details are now available of a new B.S.A. Acme Snap-Lock Limit Switch which is a flameproof version of the Standard 16 D-1200 range of Snap-Lock Limit Switches. It has been designed to the requirements of British Standard Specifications 229 and 587.

U.K. enquiries in connexion with the new switch should be addressed to Burton, Griffiths & Co, Ltd, Snap-Lock Division, 93 Albert Embankment, London, S.E.11. Overseas enquiries should be sent to B.S.A. Tools Ltd, Small Tools Division, Export Dept, Montgomery Street, Sparkbrook, Birmingham.

Iranian Oil Figures

Production of crude oil in South Iran by Iraanse Aardolie Exploratie en Productie Maatschappij N.V. amounted to 1,518,000 tons in November 1955, giving a total production of 14,217,000 tons for the period 1 January to 30 November.

Refinery throughput by Iraanse Aardolie Raffinage Maatschappij N.V. at Abadan was 555,000 tons in November, contributing to a total of 6,699,000 tons for the period 1 January to 30 November.

Figures for December were: production 1,397,000 tons, giving a total for the year of 15,772,000 tons; refinery throughput 578,000 tons, contributing to a total throughput for the year of 7,276,000 tons.

U.K. Oil Equipment Exports

During the year 1955 the following quantities of petroleum equipment were exported from the United Kingdom. Comparative figures for 1954 are also given.

	1955	1954	1955	1954
	cwt	*cwt*	£	£
Oil well drilling machinery	71,703	95,155	2,154,498	2,409,672
Mineral oil refining machinery	109,515	149,968	1,738,376	2,679,215
Oil fuel burning equipment	25,828	26,145	858,882	750,776
Domestic stoves and grates for liquid fuels (of iron and steel)	79,927	68,500	1,536,676	1,235,479
Domestic stoves and grates for liquid fuels (of non-ferrous metal)	12,705	15,143	349,582	389,710

Piping Costs

A new 12-page brochure published by The M. W. Kellogg Company deals with the Kellogg "general analytical method of piping flexibility analysis"—a method of evaluating stresses, reactions, and deflections in complex piping networks.

Using the method discussed, it is possible to specify more closely to the theoretically perfect piping design, avoiding expensive margins of safety.

Copies of the booklet are available from the Fabricated Products Division, the M. W. Kellogg Company, 225 Broadway, New York, N.Y.

Mechanical Handling Exhibition

The 1956 Mechanical Handling Exhibition and Convention is to be held at Earls Court from 9 to 19 May. More than 250 exhibitors will contribute to a display of labour-aiding equipment for every type of industry.

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WAKEFIELD-DICK INDUSTRIAL OILS LTD

In announcing the reconstruction of W. B. Dick and Co Ltd last month (page 56), it is regretted that we omitted to mention that the following members of the Board are also members if the IP: R. F. Baldwin (*general manager, Electrical Division*), C. F. Dennis, W. F. List (*assistant managing director*), L. G. Packham, A. J. Sear, and R. J. Turner (*general manager, Industrial Lubricants Division*). Other members of the Board are: L. W. Farrow, C.B.E., (*chairman*), L. M. Broadway (*deputy chairman and managing director*), J. A. V. Watson, O.B.E., J. S. Rolph (*general manager, Marine Division*), G. H. Thornley, and R. Layet.

DISTRIBUTION OF OIL

A three-day course on the distribution of oil is to be held at the Sir John Cass College, Jewry Street, Aldgate, from 10 to 12 April. It has been arranged under the sponsorship of M. E. Hubbard of the British Petroleum Co Ltd.

CORROSION PREVENTION SYMPOSIUM

The Corrosion Group of the Society of Chemical Industry are to hold a Symposium on Corrosion Prevention in Packaging and Storage at Birmingham University in the afternoon of Wednesday 11 April and the morning of Thursday 12 April 1956. Six papers will be presented, their titles and authors being: The Control of Atmospheric Corrosion of Metals in Storage and Transit, E. Ll. Evans and E. G. Stroud; Practical Methods of Preventing Corrosion in Packages, J. Feriggi; The Selection of the Packaging Method, F. A. Paine; Testing Packaging Materials, R. B. Turnbull; Packaging Service Equipment, E. L. Hill and D. J. Evans; Some Industrial Problems in Packaging and Storage, J. F. Kayser.

Further particulars and registration forms may be obtained from the Hon. Secretary of the Group, S. C. Britton, The Tin Research Institute, Fraser Road, Greenford, Middlesex.

★ ★ ★

MOTOR ACCESSORIES MANUFACTURERS ASSOCIATION

This Association was recently registered as a Company Limited by Guarantee and, at its inaugural meeting on 13 January, J. A. Middleton-Joy, M.C. (*Edward Joy & Sons Ltd*) was elected its president. The following were also elected as the Council: C. E. F. Millidge (*J. B. Pillin & Co Ltd*), A. C. Pepper, Ph.D., B.Sc. (*Alexander Duckham & Co Ltd*), and J. A. V. Watson, O.B.E. (*C. C. Wakefield & Co Ltd*).

The objects of the Association are briefly summarized in its Memorandum of Association as:

"To promote, by an exchange of information and by concerted action, the unrestricted sale and display of accessories, tyres, batteries, oils, and other products distributed by Members of the Association to the motor and allied trades".

A statement issued by the President of the Association says that the member companies will continue to compete with each other, their only tie being their desire to encourage free marketing.

The formation of MAMA has been necessitated, continues the statement, by the pressure on garages by major petrol companies who, until recently in the U.K., have applied tied marketing practices only to petrol. There are indications that they intend to follow the pattern that exists abroad and then their control may spread to other accessories.

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CRUDE OIL PRODUCTION

	1955	
	Dec.	*Jan. to Dec.*
	Brl	
Kern Oil Co Ltd:		
California	110,671	
Trinidad	84,927	
Trinidad Petroleum Development Co Ltd	339,061	
	Tons	
Kuwait Oil Co Ltd	4,306,548	53,894,068

★ ★ ★

Sunbury Honours Dr. A. E. Dunstan

An interesting ceremony took place at the Sunbury Research Station of the British Petroleum Company Ltd at the annual Christmas luncheon on 21 December 1955, when a painting of Dr A. E. Dunstan was unveiled and presented to the Research Station.

Dr Dunstan, who established the Sunbury Research Station shortly after he joined the then Anglo-Persian Oil Company in 1915, was President of the Institute from 1929 to 1931 and for 25 years was the Honorary Editor of its publications.

Since his retirement Dr Dunstan has been a regular attendant at the Christmas luncheon at Sunbury and his presence has been looked forward to with pleasant expectation by the staff of the Station, by whom he is regarded as "head of the family".

The portrait in oils which was presented is reproduced here and was executed by his son, Bernard Dunstan, who is a noted portrait painter and exhibitor. It shows Dr Dunstan in a characteristic attitude so well remembered by those who were fortunate enough to work under his direction.

Notes of the Month

IPC Pipeline in The Lebanon

The Iraq Petroleum Co Ltd issued a statement on 23 January dealing with the breaking off by the Lebanese Prime Minister of discussions on the revision of payments in respect of the Company's pipeline and terminal operations in the Lebanon.

In its agreement, dated 6 June 1955, with the Lebanese Government, the Iraq Petroleum Company undertook that in the event of its entering into an agreement with the Syrian Government which appeared to contain higher rates of payment than those contained in the Lebanese agreement in respect of comparable facilities and conditions, it would be ready at once to examine with the Government a relevant application in the Lebanon of the Syrian terms, due regard being paid to differences in the nature and scale of the operations taking place in each of the two countries concerned.

Under new agreements which were ratified by the Syrian Parliament, payments were arranged equivalent to 50 per cent of the calculated transportation profit resulting from the operation of the pipelines in Syria. The Lebanese Prime Minister had accepted this principle as a basis for discussions in the Lebanon.

The application of this principle in Syria results in payments of 1*s.* 4*d.* per ton for each hundred miles of territory traversed by the pipeline, and 1*s.* 1*d.* per ton on the terminal throughput. Pipelines conveying oil to the Lebanese port of Tripoli cross 263 miles of Syrian territory and 20 miles of Lebanon, and the Company offered to pay the Lebanon the same rates per ton mile for pipeline transportation and per ton for terminal operation as in Syria. The Lebanese Government has rejected this offer and has asked for payments equal to those made to Syria in respect of the pipeline system terminating in Lebanon, regardless of mileage. The effect of this would be that Iraq oil shipped via a Lebanese port would pay almost twice as much in transit dues as oil shipped via a Syrian port, and this the Company could not agree.

The statement ends by expressing the Company's regret that the Lebanese Prime Minister should have thought it necessary to break off the discussions, and continues to hope that it will be possible without undue delay to reach a settlement.

The suspension of discussions, the statement emphasizes, will hold up the Company's plans to divert its inoperative southern pipeline system to a Lebanese port, and to expand the throughput of the existing pipeline system to Tripoli. The Iraq Government has repeatedly urged the Company to divert to a Lebanese port its southern pipeline system, idle since 1948, and this project, together with the planned expansion of the Tripoli system, would have resulted in greatly increased revenues to the Lebanon.

Oil in Assam

Oil has been struck at a depth of nearly 10,000 feet in well No 11 at Nahorkatiya, Assam. This success follows quickly upon the completion of three "dry holes" recently announced by the Assam Oil Company.

The oil has been struck in sandstone rock at a depth between 9660 and 9785 feet, and further production tests will now be carried out.

Meanwhile, drilling continues at wells 12, 13, and 14, and plans have been made for the drilling of more Nahorkatiya wells up to No 17. At Moran, further west in Upper Assam, drilling is scheduled to begin early this month.

Iraq's First Oil Refinery

The construction of Iraq's first complete oil refinery near Baghdad has been carried out with the assistance of a large local work force specially trained for the purpose. The 24,000-b.d. refinery was designed and engineered by The M. W. Kellogg Company, which set up trade schools to train Iraqis in the specialized tasks of refinery construction, such as welding, ironworking, and steam fitting.

Baghdad refinery has been built for the Government of Iraq and processes Kirkuk crude to produce fuel gas,

stabilized gasoline, kerosine, light gas oil, diesel oil, and residual fuel oil.

A single combination unit is responsible for this production, with complementary gasoline power plant, and auxiliaries.

A sulphuric acid plant has been constructed to reclaim spent acid and to produce fresh acid for kerosine and water treating. Another feature of the refinery's facilities is a can-manufacturing plant to make and fill about 15,000 five-gallon cans per day.

Oil Exploration in New Zealand

The search for oil in New Zealand—which has been going on intermittently since 1865—is to receive new impetus in the form of a £1,000,000 programme to be undertaken by the Shell Group, Todd Brothers Ltd of New Zealand, and the D'Arcy Exploration Co Ltd—BP's wholly owned prospecting subsidiary. The BP Group is to contribute £500,000 to the scheme.

Activity will be concentrated in the Taranaki and Rangitikei areas for which Todd Brothers Ltd—a firm of motor distributors in New Zealand—hold prospecting licences. Exploration in these areas first began only seven years after the drilling of Drake's Well. Surface indications of petroleum and natural gas had long been evident and in 1865 two companies were formed to work the deposits.

Since then there have been periods of optimistic activity, such as 1906 and 1913, followed by years of uncertainty and

declining hopes. Shell's interest in New Zealand oil dates from 1906 when 4000 gallons of oil a day were flowing from the Moturoa oil well of the Taranaki Petroleum Co Ltd. Negotiations were then begun by Shell but were not finalized.

In 1913, however—a period of increased vigour when a refinery was built at New Plymouth—The Royal Dutch Shell Company was investigating the Taranaki area.

Although New Zealand is now one of the most highly motorized countries in the world, local production is still small. In the 1930's subsidiaries of Vacuum, Shell, and Caltex were carrying out exploration work at much greater depths than ever before, but without success.

Today only one company is producing oil in New Zealand, Egmont Oil Wells Ltd which produces 6000—7000 barrels a year from the Moturoa field and refines this locally. The bulk of New Zealand's supplies are, therefore, imported.

Extension of Mina al Ahmadi Refinery

The Kuwait Oil Company Ltd is planning to carry out an important programme of extension to its refinery at Mina al Ahmadi which will increase the capacity of the existing plant of 1,400,000 tons to a total of 8,500,000 tons a year. The purpose of the extension is the production of greater quantities of middle distillates, marine diesel and furnace fuel oils, including bunkers for tankers loading at Kuwait. Work will commence on a site adjoining the existing refinery at Mina al Ahmadi early in the second half of 1956 and it is expected that the whole scheme will be completed towards the end of 1957.

The scheme includes the provision of two atmospheric crude distillation units of 80,000 b.d. capacity, each with a gasoline stabilizer; oil storage tanks of varying capacity for crude feed and products, with ancillary inter-connecting lines, pumps, etc.; the necessary equipment for increasing the power, steam, and water supply facilities, oil–water separating plant and distribution lines, and extensions to the existing oil loading system to the jetty and submarine berths.

The two units are to be designed and procured by E. B. Badger and Sons of Great Britain (who built the existing refinery), and the erection of the plants and all other facilities will be engineered and constructed by the Bechtel International Corporation of the U.S.A. in association with George Wimpey & Co Ltd of Great Britain.

Automation No Threat to Economy

"An evolutionary extension of the Industrial Revolution" is how Derek Walker Smith, M.P., Q.C., Parliamentary Secretary to the Board of Trade, referred to automation at the recent annual luncheon in London of the British Industrial Measuring and Control Apparatus Manufacturers' Association. He claimed that automation offered no threat to our economy—indeed the adoption of new techniques of mechanization was a necessary part of our industrial approach to reaching higher levels of productivity in conditions of full employment. He defined automation as the substitution of mechanical, electrical and hydraulic devices for human effort.

The chairman of BIMCAM, G. A. Edwards, said that the annual product of their industry was now worth £20 million, a third of which was exported.

Sir Walter Puckey, past president of the Institution of Production Engineers, said that the biggest single managerial obstacle was apathy. The bigger single managerial possibility was interest, and automation could provide this—it was one of the best and most potent managerial tools in that direction.

Forthcoming Meetings

THE INSTITUTE

(At 26 Portland Place, London, W.1, 5.30 p.m.—tea 5 p.m.)

Considerations Affecting the Choice of Refinery Utility Installations. J. A. Shaw, B.A., A.M.I.Mech.E., A.F.Inst.Pet. **14 March**

The Oil Industry—its Place in the World and its Future. J. W. Platt, M.Inst.Pet. **11 April**

IP FAWLEY BRANCH

(At Esso (Fawley) Recreation Club, Holbury, 7.30 p.m.)

World Energy, Supply and Demand. M. E. Hubbard, B.A., M.I.Mech.E. **16 March**

Miscellaneous Oil Products in the Textile Industry. F. N. McLaren. **13 April**

IP LONDON BRANCH

(At 26 Portland Place, London, W.1, 6 p.m.—tea 5.30 p.m.)

Presidential Address. **20 March**

Distribution of Petroleum in the United Kingdom. H. D. Newlyn. **18 April**

IP NORTHERN BRANCH

(At Engineers' Club, Albert Square, Manchester 2, 6.30 p.m.)

Shock Absorbers. J. W. Kinchin. **20 March**

IP SCOTTISH BRANCH

(At G.P.R. Hall, Grangemouth)

Insurance in the Oil Industry. A. T. Wright **30 March**

IP SOUTH-EASTERN BRANCH

(At King's Head Hotel, Rochester, 7.45 p.m.)

The Production of Town Gas by the Catalytic Gasification of Petroleum Oil. J. B. McKean, B.Sc., M.Inst.Gas. E., A.R.I.C., A.M.I.Chem.E. **6 March**

Methods of Testing Petroleum Products. Dr J. E. Carruthers, F.R.I.C., F.Inst.Pet. **3 April**

IP STANLOW BRANCH

(At Grosvenor Hotel, Chester, 7.30 p.m.)

Fuels and Lubricants for Jet Engines. K. C. Hunt, A.C.G.I., A.M.I.Mech.E., A.F.R.Ae.S., F.Inst.Pet. (Joint meeting with Royal Aeronautical Society) **21 March**

Dinner and Dance. (At Thornton Research Centre, 7 p.m.) **23 March**

Thermal Insulation. (Joint meeting with Institution of Chemical Engineers at 7 p.m.) **18 April**

ECONOMICS AND OPERATIONS GROUP

(At 26 Portland Place, London, W.1, 6 p.m.—tea 5.30 p.m.)

Retaining Refinery Production in Balance for the U.K. Market. B. F. Newton. **6 March**

The Oil Year in Retrospect. K. A. D. Inglis and D. E. Miller. **5 April**

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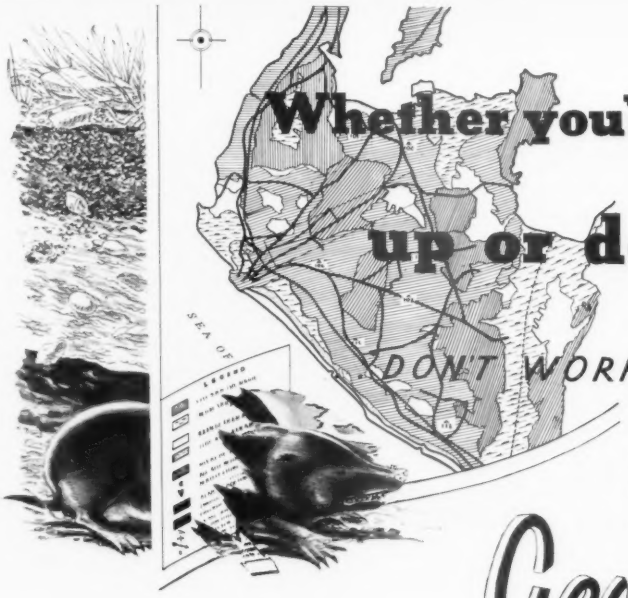

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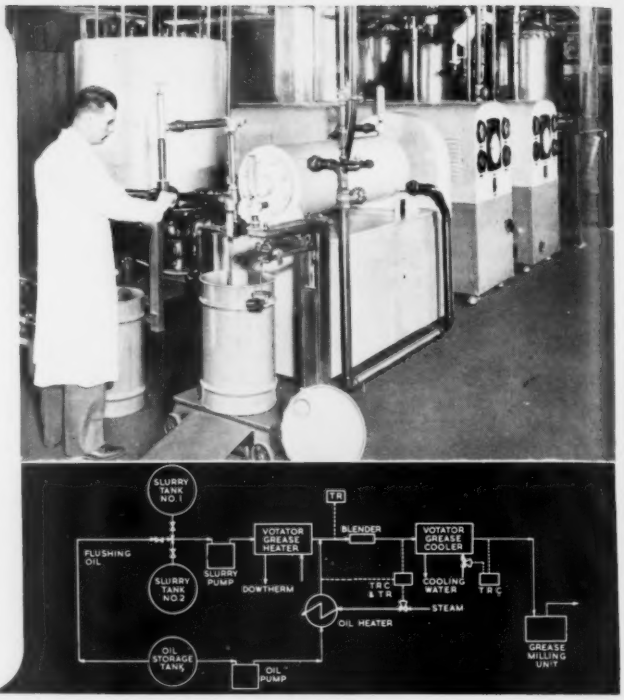

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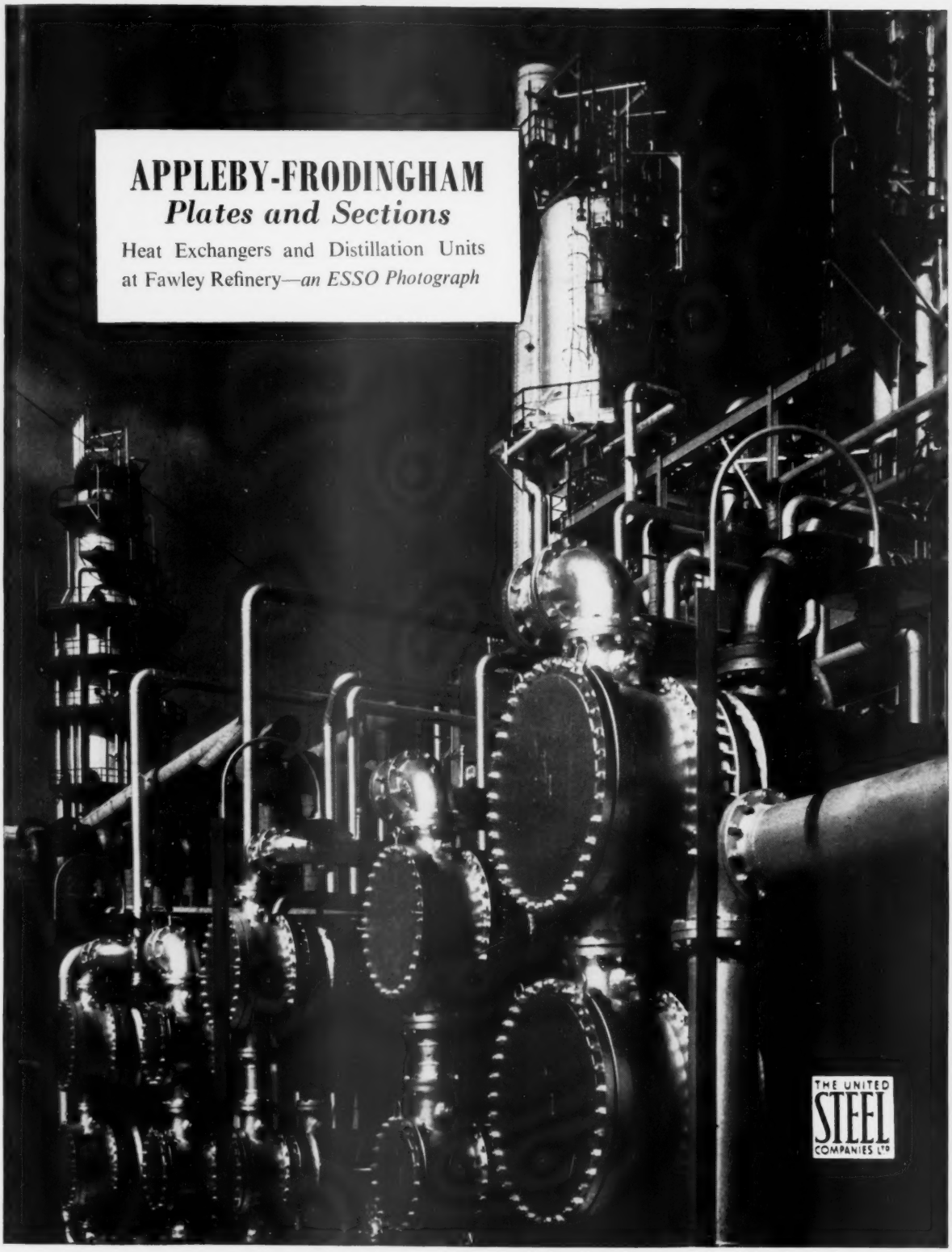

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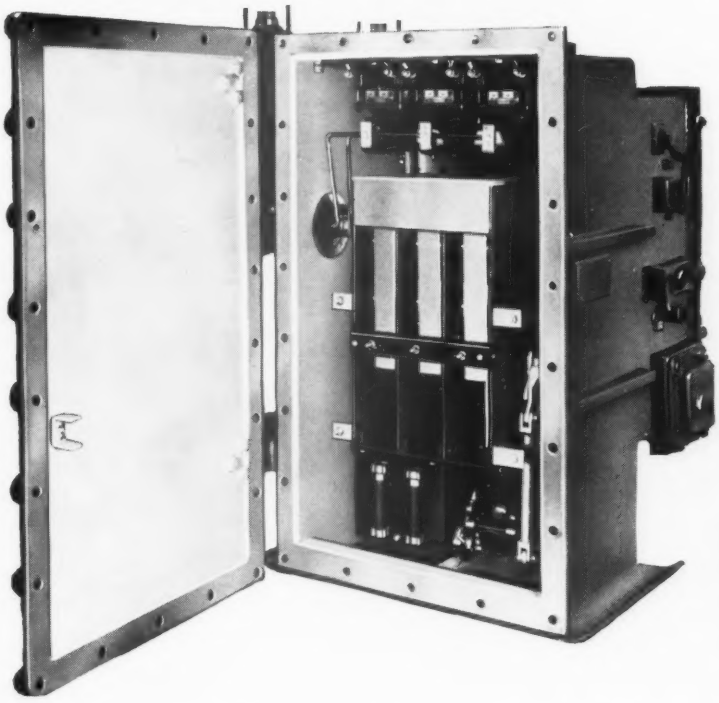

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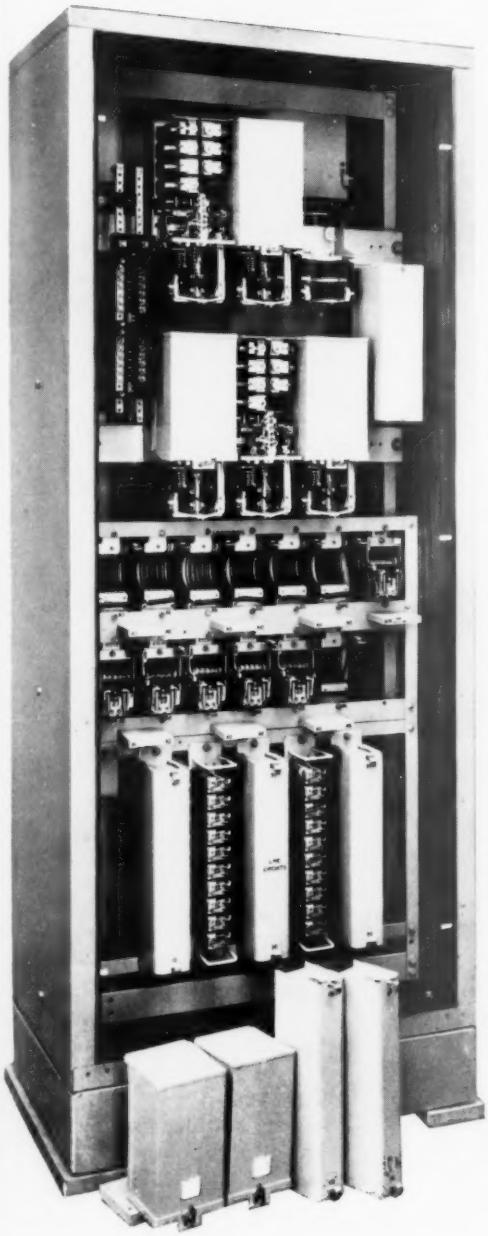

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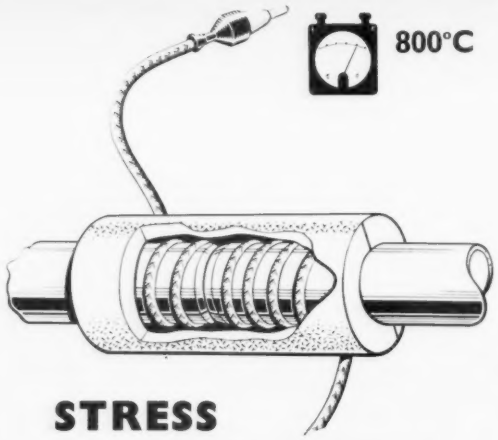

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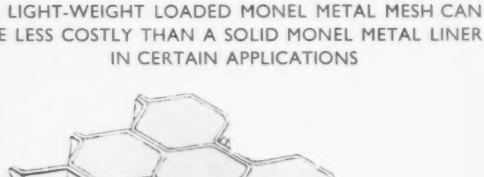

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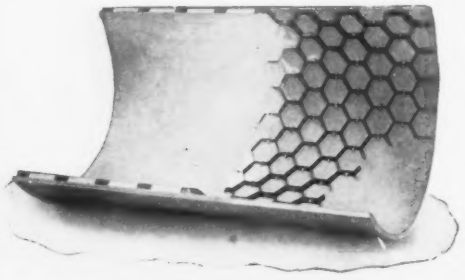

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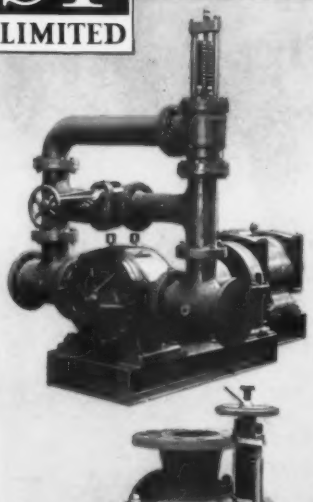

(Left)
Positive Acting Rotary Displacement Pump for the handling of Molasses and viscous fluids, electrically driven through totally enclosed Reduction Gear Box.

(Below)
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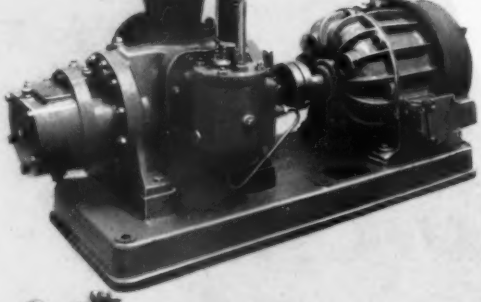

(Above)
Positive Acting Variable Output Guinard Rotary Piston Pump. Electrically driven through Reduction Gear Box, for Oils of varying viscosity.

(Right)
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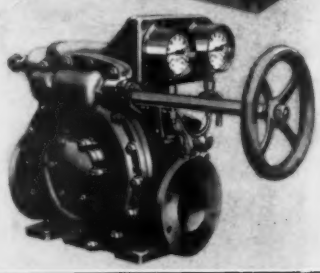

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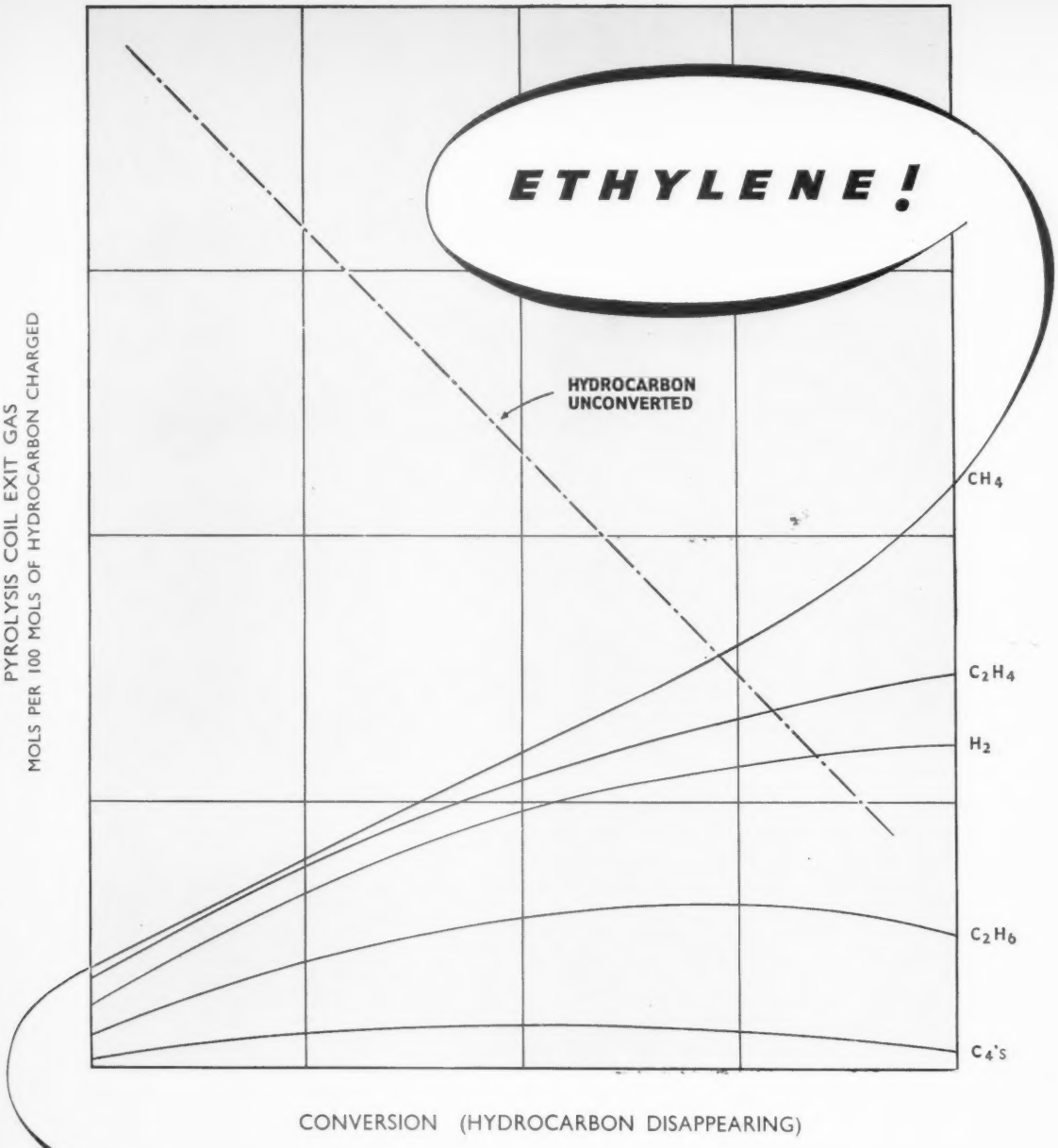

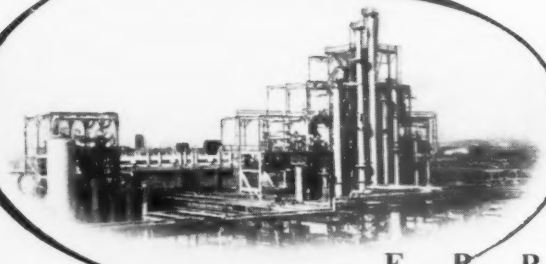

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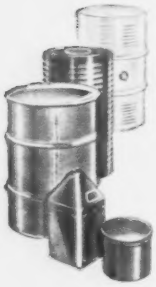

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